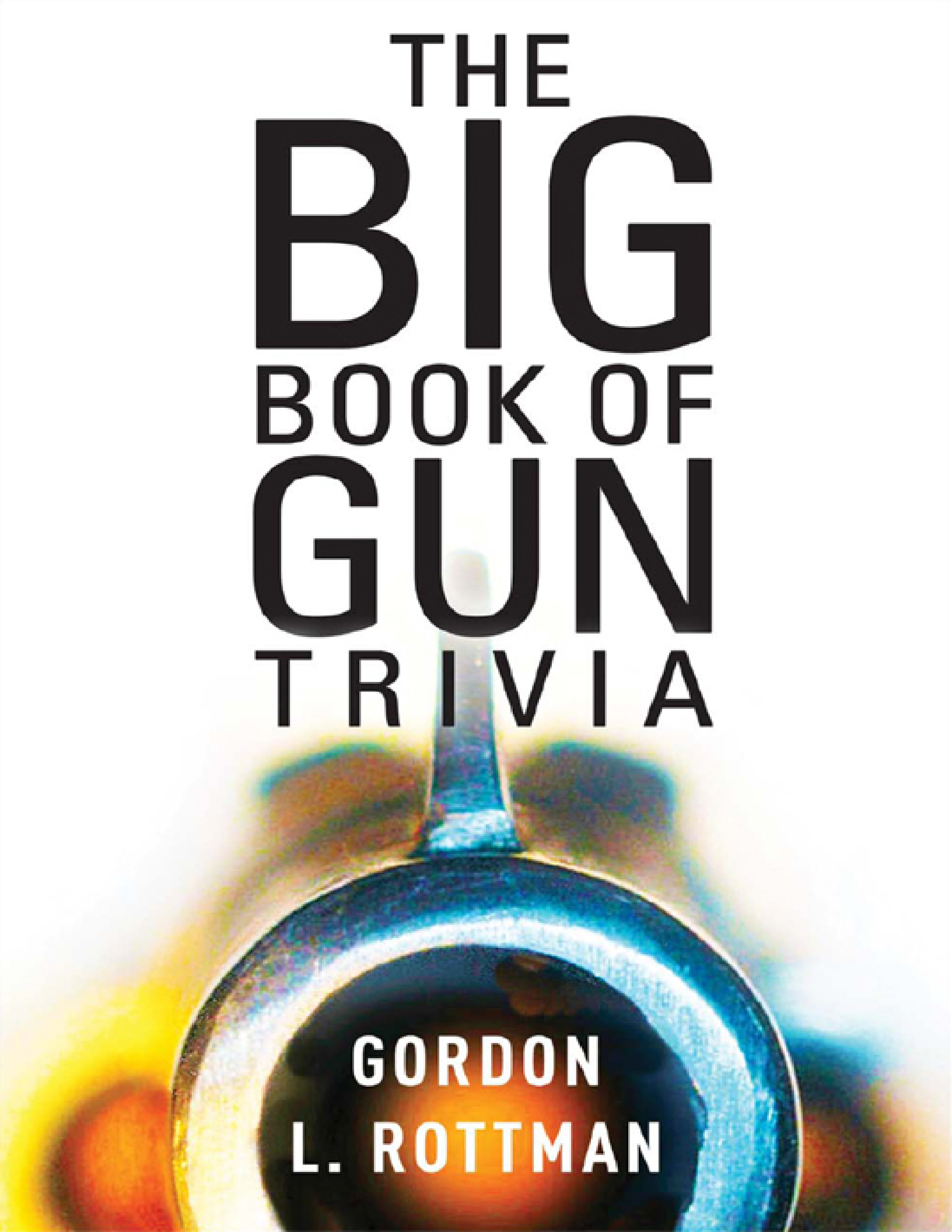
THE BIG BOOK OF GUN TRIVIA



GORDON L. ROTTMAN

THE BIG BOOK OF

GUN TRIVIA

Everything you want to know, don't want to know, and don't know you need to know;

carefully adapted for the meanest understanding

GORDON L. ROTTMAN

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FOREWORD

"I do not love the bright sword for its sharpness, nor the arrow for its swiftness, nor the warrior for his glory. I love only that which they defend."

– J. R. R. Tolkien

The sand of the desert is sodden red, –
Red with the wreck of a square that broke; –
The Gatling's jammed and the Colonel dead,
And the regiment blind with dust and smoke.
The river of death has brimmed his banks,
And England's far, and Honour a name,
But the voice of a schoolboy rallies the ranks:
'Play up! play up! and play the game!'

– *Vitaï Lampada* (The Torch of Life), Sir Henry Newbolt, 1897

It's R.S.M. O'Grady says, it's the soldier's
best friend if you care for the working parts and let us be 'aving
those springs released smartly in Company billets on wet
forenoons and clickerty-click and one up the spout and you
men must really cultivate the habit of treating this weapon with
the very greatest care and there should be a healthy rivalry
among you – it should be a matter of very proper pride and
Marry it man! Marry it!
Cherish her, she's your very own.

Coax it man, coax it – it's delicately and ingeniously made
a – it's an instrument of precision – it costs us tax-payers,
money – I want you men to remember that.
Fondle it like a granny – talk to it – consider it as you would
a friend and when you ground these arms she's not a rooky's
gas-pipe for greenhorns to tarnish.
You've known her hot and cold.
You would choose her from among many.
You know her by her bias, and by her exact error at 300, and
by the deep scar at the small, by the fair flaw in the grain,
above the lower sling-swivel – but leave it under the oak.

– *In Parenthesis,* David Jones, 1916

ABBREVIATIONS AND GLOSSARY

AA	antiaircraft
ACP	Automatic Colt Pistol (cartridge designation)
AFV	armored fighting vehicle (any armored combat vehicle, tank, recon vehicle, armored personnel carrier, etc.)
AK	*Avtomat Kalashnikova* (Russian for "Automatic Kalashnikov" assault rifle-series, i.e., AK-47, AKM, etc.)
aka	also known as
AN	Army/Navy (US joint designation system)
AP	antipersonnel or armor-piercing (meaning will be clarified in each section in which used)
APC	armored personnel carrier
APERS-T	antipersonnel-tracer ("flechette" or "beehive" round)
ASETDS	Aeronautical and Support Equipment Type Designation System (Air Force designation system)
AT4	M136 light antiarmor weapon (AT4 is the Swedish designation)
ATF	Bureau of Alcohol, Tobacco, Firearms, and Explosives
BAR	Browning automatic rifle (M1918-series) (pronounced "B-A-R")
BMG	Browning machine gun (refers to the US .50-caliber cartridge)
C4	composition C4 plastic explosive
CIA	Central Intelligence Agency
cm	centimeter (approximately 4/5in)

COMP B	Composition B (high-explosive used in grenades and projectiles)
detcord	detonating cord (“primacord”)
DMR	designated marksman rifle
DODAC	Department of Defense Ammunition Code (pronounced “doe-dac”)
DWM	*Deutschen Waffen-und Munitionsfabriken* (German Weapons and Ammunition Factory)
EBR	enhanced battle rifle
FBI	Federal Bureau of Investigation
FM	Field Manual (Army)
FN	*Fabrique Nationale de Herstal* (National Fabrication of Herstal, Belgium)
FN FAL	*Fabrique Nationale Fusil Automatique Legere* (light automatic rifle)
GmbH	*Gesellschaft mit beschränkter Haftung* (company with limited liability)
GPMG	general purpose machine gun
GPS	Global Positioning System
H&K	*Heckler und Koch GmbH* (marked HK on weapons)
H&R	Harrington & Richardson Firearms
HB	heavy barrel (.50-caliber HB M2 machine gun)
HE	high-explosive
HEAT	high-explosive antitank (shaped-charge or hollow-charge) (pronounced “heat”)
HMMWV	High Mobility Multipurpose Wheeled Vehicle (aka “Humvee,” “Hummer”)

kg	kilogram (2.2lb)
km	kilometer (1,000m; 3,280ft; just over half a mile)
LAW	Light Antiarmor Weapon (M72-series and M136 [AT4] single-shot rocket launchers) (pronounced “law”)
lb	pound(s) (0.4535kg)
LLR	long-range reconnaissance
m	meter (1,000mm; 39.37in)
M	Model
MAAWS	Multi-role, Antipersonnel, Antiarmor Weapons System (Carl Gustav 84mm M3 RR)
MG.	German for *Maschinengewehr* (machine gun)
Mk	Mark
Mod	Modification (used in conjunction with Mark)
MOUT	military operations on urbanized terrain (combat in built-up areas)
mm	millimeter
MP.	German for *Maschinenpistole* (machine pistol; a submachine gun)
NATO	North Atlantic Treaty Organization (pronounced “nay-tow”)
No.	Number (also #)
OPFOR	(Opposing Forces – the maneuver enemy)
OSS	Office of Strategic Services
OVE	on-vehicle equipment
pdr	pounder (British artillery designation system)
PETN	pentaerythritol tetranitrate high-velocity explosive used in detcord and blasting

	caps)
PIAT	Projector, Infantry, Anti-Tank (weapon)
RDX	Research Development Establishment explosive (high-explosive used in projectiles)
RPG	*Ruchnoi Protivotankovii Granatomet* (Russian for “hand antitank grenade launcher;” direct translation does not really mean “rocket-propelled grenade”)
rpm	rounds per minute
RR	recoilless rifle
S&W	Smith & Wesson
SAW	squad automatic weapon (M249) (pronounced “saw”)
SEAL	Sea, Air, Land (Navy special warfare force) (pronounced “seal”)
SIG	SIGArms – *Schweizerische Industrie-Geshellschaft* (Swiss Industries Company)
SMAW	shoulder-launched multipurpose assault weapon (Mk 153 Mod 1)
SMG	submachine gun
SMLE	short, magazine, Lee Enfield rifle (pronounced “smill”)
SOE	Special Operations Executive (British)
SOPMOD	(Special Operations Peculiar Modification)
STANAG	Standardization Agreement (NATO) (pronounced “sta-nag”)
SWAT	Special Weapons and Tactics (or “Special Weapons and Toys”)
TNT	trinitrotoluene (high-explosive)
TOW	tube-launched, optically-tracked, wire-command link guided

	missile (pronounced “tow”)
UK	United Kingdom
UN	United Nations
US	United States
USSR	Union of Soviet Socialist Republics
WCF	Winchester Center Fire (cartridge designation)
WP	white phosphorus (smoke and incendiary compound)
yds	yards
°C	degrees Centigrade
°F	degrees Fahrenheit

Chaff Chaff was aluminum foil strips that when dispensed hampered radar-guided missiles.

Cook off A “cook-off” is caused when a cartridge remains in the weapon’s chamber and the overheated barrel heats the cartridge to the point that the propellant ignites.

Flechettes Flechettes were small antiperonnel darts

Monitor In the Old West the term “monitor” referred to a guard or watchman.

Parkerizing Parkerizing is a method of protecting gunmetal from rust, increasing its resistance to wear, and provides a low-reflective finish through the application of an electrochemical phosphate conversion coating.

Percussion caps

Percussion caps as a means of igniting muzzle-loading weapons were developed in 1807 by a Scotsman, Alexander Forsyth (1768–1843). They did not see much use until the early 1820s, but their popularity began to spread through the 1830s and 1840s.

Pointblank range

Pointblank range is defined as a shot fired within approximately 3ft (1m) of the target.

White glove inspections

White glove inspections entailed an NCO wearing white cotton gloves examining the weapons parts for excessive oil and remaining fouling. A “white glove” inspection meant a extremely detailed inspection.

1.
ESSENTIAL WEAPON FACTS

As with any other area of research, weapons have their own histories and stories. Many of these are admittedly esoteric, obscure, and certainly fall in the category of trivia, but are nonetheless interesting and often provide further insight into the development, history, and employment of weapons. Understanding the evolution and development of weapons and how they were employed enhances the understanding of military history and how tactics and combat techniques evolve. If a soldier or Marine has an understanding of the history of weapons and their employment, he can better adapt the use of his weapons to his current circumstances, which seldom fit the tactical environment envisioned by manuals. This chapter provides some interesting historical insight and answers questions regarding weapons history.

Which weapons in the US ARMY and MARINE CORPS INVENTORY have been IN USE THE LONGEST?

The longest-serving US weapons are listed below. All of these have had some form of modification even if the designation has remained the same. Most of these weapons are being phased out, but will still be found in use in National Guard and Reserve units, and sometimes in Active Army and Marine units.

Weapon	Standardized	Comments
.45-caliber M1911A1 pistol	1926	The M1911 was issued in 1913. Phased out by the M9 in the late 1990s, it is still the

		most veteran of the US weapons and special operations versions are still in use today and will be for some time.
.50-caliber M2 machine gun	1933	Essentially unchanged, it will be around for the forseeable future.
.45-caliber M3A1 submachine gun	1944	Phased out by the M4 carbine in the early 2000s.
7.62mm M60 machine gun	1957	This is currently being phased out by the M240B/G, but will be around for the next few years.
7.62mm M14 rifle	1957	This is currently being reissued as the Mk 14 designated marksman rifle and is expected to remain in use for some time.
81mm M29A1 mortar	1964	The M29 was adopted in 1952 and is being phased out by the M252.
5.56mm M16A1 rifle	1967	The M16 was adopted in 1963 and is being phased out by the M16A2/A4.
40mm M203 grenade launcher	1969	Replacements (M320 and XM25) were adopted in 2008 and fielded in 2010, but the M203 will be around for awhile.

What are the LONGEST SERVING MODERN military RIFLES in the world?

- British-designed and Indian-made **.303 Lee Enfield No. 1 Mk III rifles**, the SMLE (short, magazine, Lee Enfield rifle), designated the Mk III prior to 1926, are still in service in India and Nepal, and, regardless of the proliferation of AK-47s, they still turn up in Afghanistan. The design was adopted in 1907, and these particular rifles were made at Ishapore Arsenal between 1939 and 1955. They are also still in use in Papua New Guinea, these having been produced at Lithgow Arsenal, Australia prior to 1955.

- Adopted in 1931 and refined for mass production in 1939, the **British .303 Lee Enfield No. 4 Mk 1** served as the standard British and Canadian service rifle until replaced by the 7.62mm L1A1 self-loading rifle (FN FAL – *Fabrique Nationale Fusil Automatique Legere* – light automatic rifle) in 1957. They remained in frontline use into the 1960s and No. 4 Mk I* Enfields are still in use with the Canadian Rangers (a volunteer, part-time northern coastal patrol organization – modern day Coastwatchers), due to the rifle's reliability in arctic conditions; plus they are cheap to produce. It is planned to re-barrel the .303 (what the Canadians now call 7.7x56mmR) and otherwise modify these rifles to fire the 7.62mm NATO round so its service is expected to continue for quite some time. It is also used by Canadian Search and Rescue Program and Mapping and Charting Establishment personnel as a self-defense weapon against polar, brown, and black bears if they are a problem. No. 4 Mk I rifles are still found in use in various African countries by reserve forces, constabulary, police, and game wardens. British 7.62mm NATO conversion kits for No. 4 rifles were developed in the late 1950s and are referred to as L8-series rifles. Lee Enfields, of all the many Marks, are considered the second most numerous make of rifles ever produced. As of 2008 it appeared that Lee Enfields were in use with the Taliban in Afghanistan; while Soviet and Chinese weapons like the AKM are still the mainstream arms of choice, the "ancient" bolt-actions are regaining popularity owing to their long range, giving them a degree of standoff. However, this has not posed

much of threat to NATO forces who possess much better long-range sniper rifles and machine guns, as well as effective body armor.

SPECIFICATION:
Lee-Enfield SMLE Mk I

Caliber: 0.303in
Operation: Bolt-action
Feed: 10-round detachable box magazine
Length: 44.57in (1,132mm)
Barrel length: 25.19in (640mm)
Rifling: 5 grooves, l/hand
Weight: 8.18lb (3.711kg)
Muzzle velocity: 2,025ft/sec (617m/sec)

- The **.30-caliber M1 Garand** rifle, while a mainstay piece through two wars, only saw about 25 years of general service. While adopted in 1936 by the Army – 1941 by the Marines – it did not see a wide issue until 1942. Production ceased in 1957 and the M1 began to be replaced by the M14 in 1959. Over 40,000 National Match M1s were built or rebuilt between 1953 and 1963. The M1 remained in some active units' hands until the early 1970s and was still in use by National Guard and Reserve units. As an aside, most of these units went from using the M1s to M16A1s and never saw M14s.

- Two of the longest serving rifles in US service are the **.30-caliber M1903 Springfield** and the **7.62mm M14**. The M1903, issued in 1906, continued in use as a sniper rifle after the Korean War until at least 1954. It was rated as a standard rifle throughout World War II even though the M1 Garand had replaced it in frontline service. The M14, standardized in 1957, first issued in 1959, is still in use today as a much modified designated marksman rifle (DMR) and competitive match rifle. It is presently carried by US Military Academy, West Point cadets, and will be

for quite some time, and is also used as a ceremonial weapon. The M21 sniper rifle version is currently in use in Iraq and Afghanistan as backup for newer sniper rifle models. The Navy is replacing the M14 for shipboard use with the M16A3, but is still using M14s for line-throwing with the Mk 87 Mod 1 line-throwing adapter kit. The Navy's much-modified Mk 14 Mod 0 Enhanced Battle Rifle (EBR) was fielded from 2004 for use by special operations forces and the Army's designated marksmen. Produced only from 1959 to 1963, the M14 has over 50 years of service, although not continuous frontline service. There is no telling how long it will soldier on in some capacity, although the M16/M4-series rifles will eventually surpass it for length of time in service.

- German **1898 Mausers**, license-built in numerous variants by many countries, come in third place in terms of length of service of bolt-action rifles. Modernized versions of the '98 Mauser, the upgraded designs being developed in the 1930s, are still in limited use in a few armies. These are based on the 7.9mm Kar.98k Carbine of 1933, the standard shoulder arm of the Wehrmacht. Mexico and Brazil were still building Mausers in the late-1950s, while Israel was converting Czechoslovak-made Mausers to fire the 7.62mm NATO. Mausers are still in service in some armies as traditional ceremonial pieces and are issued to secondary units. Mexico and Brazil, for instance, still issue .30-06 M1954 Mausers to service and reserve units. The Danish Royal Navy's elite *Slædepatruljen Sirius* (Sirius Sledge Patrol) are armed with 7.9x57mm Kar.98k Mauser carbines for polar bear protection as they patrol northern and eastern Greenland.

- The Soviet-made **7.62mm Mosin-Nagant M1891/30** rifle and **M1944** carbine were retired from standby service by former Warsaw Pact states in 1998 – some units had been armed with them into the 1960s – and likely sold on the commercial market as a source of income for the cash-strapped countries. These were produced both during and immediately after World War II and since held in reserve stocks. The Mosin-Nagant (known as the "M-N" to collectors), and several of its variants, is considered to be the most numerous bolt-action rifle ever produced *without* including those produced in China, Finland, Poland, and the US (for Russia during World War I).

- The Soviet **7.62mm AK-47** assault rifle is another extremely long-serving weapon. Although adopted in 1949 (not 1947 as suggested by the name) and not widely available to the Soviet Army until 1956, it is still going strong and will be for many vintages. The modernized AKM was adopted in 1959 – and, in fact, most "AK-47s" seen since the mid-1960s are actually this updated version – while the revised 5.45mm AK-74 was introduced in 1978. The AK-100-series was introduced in 1994 in 7.62mm, 5.45mm, and 5.56mm NATO variants for export and is not used by the Russian armed forces. The AK-200-series is under development for commercial sales. In all, the AK's many variants have been produced in over 20 countries over the years and used by over 80 national armed forces, plus police and security forces, as well as scores of insurgents, guerrillas, militias, crime gangs and cartels, and other non-state groups. It is the most prolific of modern weapons with an estimated 75 million AK assault rifle variants produced along with 25-million other variants including light machine guns and submachine guns. AKs can be expected to be around for many years to come.

SPECIFICATION:
AK47

Caliber: 7.62 x 39mm
Operation: gas
Cyclical rate: 600rpm
Length (stock extended): 34.25in (870mm)
Barrel length: 16.37in (416mm)
Weight (empty): 8.59lb (3.90kg)
Muzzle velocity: 2,300ft/sec (710m/sec)
Magazine: 30 rounds

What was the LONGEST-SERVING PRE-MODERN military RIFLE?

Turning to pre-modern weapons (pre-1880s when breech-loading, repeating, smokeless powder cartridges came into use), the longest-serving shoulder arm of all time was probably the British **.75-caliber Long and Short Land Pattern Muskets**, popularly known as the **"Brown Bess."** (The smoothbore was .75-caliber (19mm), but the 1-ounce lead ball was .71-caliber (18mm) to allow for the tallow-dipped paper cartridge, containing the ball and black powder charge, and serving as a patch. In shotgun terms this would be about 11-gauge.) It soldiered in regular British frontline service from 1722 to 1836 – a total of 114 years – in upgraded versions, and some were still in use during the Crimean War (1853–56) and Indian Mutiny (1857–58). It was used across the Empire by regular, colonial, and militia troops, as well as by American revolutionaries (1775–83) and even the Mexican Army during the Texas Revolution (1835–36) and the Mexican–American War (1846–48). Small numbers of late-pattern Brown Bess muskets, converted from flintlocks to percussion cap, were used by the Confederacy during the American Civil War (1861–65). These were converted at the Tower of London Royal Armouries in 1839 and referred to as "Tower muskets." There is no telling how long Brown Besses remained in use in some capacity, probably at least into the 1870s – that's over 150 years.

Some argue the term Brown Bess was seldom, if ever, used by soldiers of the era, being embraced more by historians and collectors. However, the *Connecticut Courant* (1771) contained a line, "… but if you are afraid of the sea, take Brown Bess on your shoulder and march." The *Dictionary of Vulgar Tongue* (1785) listing vernacular terms described, "Brown Bess: A soldier's firelock. To hug the Brown Bess; to carry a firelock, or serve as a private soldier." (The term "vulgar" in those days referred to slang and rustic or simple everyday language.) Brown Bess appears not to have been picked up as the weapon's nickname until late in the 1700s, before which it was simply referred to as the "brown musket." There is no substantiated explanation as to the origin of "Brown Bess." The "Brown" is variously said to refer to the brown walnut stock, the brown "russeting" metal treatment, or the brown varnish applied to protect metal and wooden parts. Regardless, the weapon appeared very brown. It is probably any or all of these depending on the beholder's perception. "Bess" is said to refer Queen Elizabeth I (1533–1603), colloquially known as "Good Queen Bess," but she died over 100 years before the musket's adoption. It is also suggested to

have been derived from blunderbuss or arquebus, 16th and 17th century firearms. Another theory is that it was derived from the German *brawn Büchse* or *braun Büchse* (strong gun or brown gun), possibly from Hessian mercenaries in British employ. Or "Bess" could have come from the Dutch *Buss* in the same context. The Queen Bess theory is the most plausible, the Virgin Queen being known as a hard and demanding woman. Bess could have been a common nickname for a soldier's girl during the Brown Bess era; as Rudyard Kipling (1865– 1936) said of the Crown's enemies, "They were pierced to the heart by the charms of Brown Bess." He also compared the Bess to "An out-spoken, flinty-lipped, brazen-faced jade, with a habit of looking men straight in the eyes." Will we ever know the true origin and meaning of the term? As Post-Captain Jack Aubrey says, "Never in life you scrub."

American Weapon DESIGNATION and STANDARDIZATION

Standardized equipment is designated by **"M" (Model)** and modifications by **"A" (Alteration)**. **Experimental** and **preproduction** weapons are designated by **"XM"** and further modifications identified by **"E" (Experimental)**, for example, XM177E2. The official designation of US ordnance items and munitions (and all other items in the US inventory) were officially designated in reverse order, e.g., "rifle, 5.56mm, M16A4," a practice adopted in 1920 in order to better catalog equipment for requisition.

Model designations can be a confusing study full of conflicts and inconsistencies. There were so many different designations systems, series, changes, and exceptions that there appears to be no rhyme or reason.

Prior to 1962 Ordnance Department-developed weapons were assigned model numbers or "ordnance numbers" according to the type of weapon, e.g., M1 rifle, M1 submachine gun, 81mm M1 mortar, etc. From 1962 weapons were generally numbered in sequence as developed, although some weapons, rifles, and tanks for example, are numbered in their own series. Additionally, rather than experimental weapons being assigned a different "XM" number than the standardized model number as was done under the old system (the T44E4 rifle became the M14, for example), they retain the same developmental model number with the "X" dropped.

Experimental modifications of standardized models have an “E” appended. For example, the M16A2E4 rifle became the M16A4 when standardized. Experimental Chemical Corps munitions were designated by “E”; the E16 white phosphorus (WP) hand grenade, for example, was standardized as the M34. Modifications were identified by an “R” (Revision). Occasionally a “B” identifier is attached to a designation, the 3.5-inch M20A1B1 rocket launcher, for example. The “B” indicates an alternate material or manufacturing technique. “C” is sometimes used to indicate a modification or conversion. Since the 1980s M240 machine gun variants have been identified by the addition of a sequential letter, e.g., M240B, M240G, etc. rather than by A1, A4, etc. (Note that “A” and “E” are not used in this system so there is no confusion with weapons designated “A1” or “E1.”)

Weapons developed under Navy proponency, some of which are used by the Marine Corps and Army, are designated Mark **(MK or Mk)** and improvements by **Modification (MOD or Mod)**, for example, MK 153 MOD 1 SMAW (shoulder-launched multipurpose assault weapon) and the Mk 19 Mod 3 grenade machine gun. This is sometimes shown as Mk 19-3 as a form of shorthand and the original basic weapon is shown as Mk 153 Mod 0. Experimental weapons are designated with EX, for example the EX 27 MOD 0. This system has been in use since the 20th century using Roman numbers, but was changed to Arabic numbers on April 17, 1944, and is regulated by MIL-STD-1661, *Mark and Mod Nomenclature System.* Weapons usually retain the Navy designation if adopted by another service. The Navy though, if adopting another service’s weapons, may or may not assign its own Mark designation.

Air Force proponency projectile-firing weapons, ranging from shoulder-fired small arms to aircraft-mounted 30mm rotary cannons, are designated “GAU-” followed by a number. Modifications are identified by a slash (/) and a letter, e.g., GAU-15/A .50-caliber machine gun. “GAU” is simply an Aeronautical and Support Equipment Type Designation System (ASETDS) code and not an abbreviation for anything regardless of the “abbreviations” some attempt to concoct from this system. **“GAU”** officially translates to **GA = Airborne Gun, U = Unit**.

Prior to 1918, US Army Ordnance Department weapons and munitions model designations were identified by “Model of” followed by the year of adoption, officially “Model of 1903” for example. “M” was sometimes used instead of “Model of.” In 1918 a mark (Mk) designation was introduced followed by a Roman numeral of the weapons’ category series; each type of weapon was numbered in its own series. However, many weapons were still assigned “Model of” (M) designations. An oddity of World War I designations was that the US adopted numerous French weapons, and rather than assigning a new designation for the year adopted, the US usually retained the original French year of adoption. For example, the US adopted the “French 75” field gun in 1917, but designated it the M1897.

On July 1, 1925 a revised weapons and munitions designation system was adopted. Weapons adopted prior to 1918 retained their “M” and year designation, those adopted between 1918 and 1925, though there are only a few, and originally designated “Mk” and “M” retained the ‘Mk” designation and Roman numeral, but the “M” modification identifier and Roman number were replaced by an “A” and an Arabic number resulting in, for example, the Mk IIA1 hand grenade. Newly designed weapons were identified by Model (M) followed by an Arabic series number, e.g. 105mm M1, M2, and M3 howitzers.

Army developmental items were identified by “T” (Trial or Test, there is some unresolved debate on this) and their modifications by an “E” (Experimental). Developmental items which were type classified (standardized) received a new model designation and number, which did not correspond with its former “T-E” designation; for example the 90mm T119E4 recoilless rifle became the M67 when type classified as Standard A. This system was adopted in 1926, modified in 1950 (beginning with T130), and used until 1962 when the “XM” system was adopted. It is presently called the Army Nomenclature System, MIL STD-1464A.

Items prefixed with “AN-” (Army/Navy) identified material jointly standardized by the Army and Navy Standardization Board prior to and during World War II. This does not imply that all materials used by both services were so designated; most were not. Nor does it mean that munitions not designated by “AN-” were not used by both services. When the system was originally adopted the Army included the Army Air Forces and the Navy was inclusive of the Marine Corps. Weapons and munitions

designated “AN-” have retained the prefix, but it is no longer assigned to new items as all items are available for joint service use.

US aircraft designations, P-47D, B-2A, F-16A, C-130J, and UH-60L for example, are hyphenated, as are radios, other communications-electronics equipment, and surveillance and aiming devices such as the AN/PRC-25 radio, AN/PPS-5 ground surveillance radar, and AN/PVS-4 weapons night vision sight. The “AN” again represents “Army/Navy,” but identifies the Joint Electronics Type Designation System or “AN System” used by all US armed services. This is regulated by MIL-STD-196E, *Joint Electronics Type Designation System,* a complex array of code letters to designate specific types of equipment with three-letter codes. This system was adopted in February 1943 to provide a more definable designation system. Prior to its adoption all electronic devices, whether they were a radio, radar, or mine detector were designated “SCR-” for “Set, Complete, Radio,” which became “Signal Corps Radio” by general consensus early in World War II. This even applied to radar, as radar sets were not given designations that would identify them as radar owing to security measures.

Weapons and munitions were classified by standardization categories as specified by Army Regulation 850-25. When a weapon or piece of equipment is said to be “standardized” or “adopted,” it is actually “type classified” in one of several categories:

- **“Standard A”** items were the most advanced available, performed satisfactorily, and were preferred procurement.
- **“Substitute Standard”** (sometimes called “Standard B”) items were those with the same general characteristics as Standard A items, but may not have performed as satisfactorily. They were issued when Standard A items were not available and had usually been previously classified as Standard A until they were replaced by an improved system, the new Standard A. Such weapons were often supplied to allies, used for training, or issued to service support units rather than frontline combat units.
- **“Limited Standard”** items were usually of limited procurement for special requirements or were previously Standard A or substitute standard items which remained in low stock levels. They preformed relatively satisfactorily, but were issued only when necessary, often for some short-

term special purpose. Their use may have also been limited to training or other non-tactical applications. Such items were eventually reclassified as "obsolete" when sufficient Standard A items were available or they had deteriorated or worn out over time.

Something should be said about standardization and fielding dates. When a weapon is type classified, or adopted, on a certain date, that does not mean that it immediately began to be issued on that date. Test and other preproduction developmental weapons were specially produced in very limited "preproduction" or "pre-series production" runs. A good deal of time is necessary for production lines to be retooled or new lines built. Existing production runs of the weapons being replaced by the new item often had to be completed before lines could be converted. Once sufficient numbers were produced, they had to be shipped to deployed units and distribution had to be made after units were pulled out of the line for refit. Additionally, parts to be used for repairs had to be fed into replacement channels, and manuals, training aids, and accessories and accoutrements (ammunition pouches, holsters, etc.) had to be distributed. It is often assumed that because a weapon was standardized, say, in September 1944, that it was soon in the field. Even in the urgency of wartime it would usually take a year for it to reach the field, sometimes considerably longer, and it would be some time before all units received the weapon. There were US weapons adopted in early 1944 that did not see combat in World War II, but the assumption was that they had been used in combat. This applied to other countries as well. In peacetime it could be years before newly standardized equipment items reached user units. Even after standardization, only low-rate production might commence with issue to selected units. Further bugs would be worked out, modifications made at the suggestion of the users, and other improvements made before they commenced general issue to all units.

Is there a HYPHEN in US military weapon MODEL NUMBERS?

No, it's M16A4, *not* M-16A4, nor M16-A4. Even though hyphens appear in some official publications, it is incorrect to use them.

HOW DOES ONE VERIFY THIS?
Look at what's stamped on the weapon itself, or on the equipment data plate, not in a publication.

According to MIL-STD-1464A, *Army Nomenclature System*, dashes or spaces *must not* be used in Army Nomenclature numerical designators.

NON-AMERICAN weapon model DESIGNATIONS

The weapon designation systems used by other countries can vary dramatically from that used by the US. In many instances designation practices have changed over the years and sometimes two or more systems may have been used simultaneously. Some weapons may have been known by two or more designations, an experimental or developmental, a factory designation, a standardized military designation, and perhaps an export or commercial designation (often incorporating the abbreviation or initials of the designer or manufacturer). Only generalities can be discussed here and only small arms designations are addressed, not heavier weapons, armored fighting vehicles (AFV), and other equipment.

British Commonwealth nations previously designated weapons with a Mark (Mk) number. One will find weapons designated with both Roman and Arabic numerals; initially Roman numerals were used, but in 1947 it was officially changed to Arabic. It can be found both ways in reference books, and of course weapons produced prior to the change will still be marked with Roman numerals. From 1926 many small arms were additionally designated by an Arabic Number (No.), e.g. No. 1 Mk III rifle, "No. 1" being the basic weapon and "Mk III" the third major modification or variant. Existing weapons still in use were redesignated under this system. Minor modifications were identified by an asterisk called a "star" (*), for example the No. 2 Mk I* revolver, and could be identified by multiple stars. Each category of weapon was assigned a number and was also assigned a sequential mark number. However, many weapons, particularly machine guns and machine carbines, had only a mark number, such as the Mk II Sten gun. A new system was adopted in 1957, whereby weapons were designated "L" for "Land Service" followed by an "A"

variant number, e.g. L7A1 machine gun. Experimental weapons lacked the "A" variant number, L20 for example, and would have "A1" appended if adopted; "XL" came into use later.

Australia adopted "F" for "Forces" and **Canada** "C" for "Canadian" to designate their weapons. **New Zealand** simply uses the designation of the weapon's country of origin. The Royal Navy uses "N" for "Naval Service."

Some countries assign their own designations to weapons if they are indigenously developed or are of foreign origin, but do not already possess a common designation. For example, the Australians assigned F1 to their homegrown submachine gun and F89 to the FN (*Fabrique Nationale de Herstal)* Minimi machine gun as it had no numeric designation, but it retained M60 for the US machine gun when they adopted it. Other countries have assigned their own designations to any foreign adopted weapon irrespective of its original designation; Germany does this, for example. **South Korea** has produced many licensed US weapons and have retained the US model number, but prefixed "M" with "K," the 60mm KM19 mortar is a good example, which was a copy of the US M19. Korea also uses a lone "K" to designate some weapons, such as the K6, their version of the US .50-caliber M2 machine gun.

During World War II the **Germans** used a system of abbreviations identifying the type of weapon followed by the last two digits of the year of adoption, e.g. 7.9mm Kar.98k carbine; pronounced as "Car ninety-eight" by collectors. The German soldier referred to it as *"k acht und neunzig"* (k eight and ninety) – phonetically "car achht oond noinsigg." A modification would be identified by a lower case letter, in this case "k" meaning *kurz* for short, although such appended letters were seldom used. The Germans were rather loose when it came to differentiating rifles from carbines. It was not uncommon for short-barreled carbines (*Karbiner*) to be designated rifles (*Gewehr*) and vice versa. German designations are often shown as "MG 34" for example, but the correct designation is "MG.34" (period after the letters, no space between the letters and number).

Common small arms designation abbreviations included:

Gew.	*Gewehr*	Rifle

Kar.	*Karbiner*	Carbine
MG.	*Maschinengewehr*	machine gun
MP.	*Maschinenpistole*	machine pistol
P.	*Pistole*	Pistol
PzB.	*Panzerbüchse*	antiarmor rifle
StG.*	*Sturmgewehr*	assault rifle

* "Stg.," with lower case "g," designated stick hand grenades – *Stielhandgranate.*

The Germans used a large number of captured and impounded weapons. They assigned their own number designations under the Foreign Equipment system (*Fremden Geräts*) with the abbreviations in the table above followed by a parenthesized lower case letter identifying the country of origin, for example, (r) for *russisch,* so the Soviet Mosin-Nagant M1891/30 rifle was known as the 7.62mm Gew.252(r). The current German system uses similar designations, e.g. "G" instead of "Gew.," and sequence numbers instead of year numbers, e.g., P1 pistol, G3 rifle, MP5 machine pistol, MG3 machine gun.

The **Soviet/Russian** system designates small arms with two- to five-letter designations identifying the designer or design bureau and sometimes includes a letter or two identifying a characteristic like the "P" in the DP light machine gun, which means an "infantry mount." Large crew-served weapons, AFVs, etc. do not include the design bureau identification and the letters only identify the type of equipment. The letters are followed by a two-digit year of adoption or a series number and are separated by a hyphen (-). Some weapons may be identified only by a "year model" shown as a Westernized "M1944" for example, with or without a hyphen.

Nationalist **China** designated its weapons "Type" followed by the year based on the 1911 Revolution (first year), a throwback to the old dynasty system. This was used until 1948 (38th year). When the communists took

over in 1949 they continued to designate weapons by Type, but used the last two digits of the Western calendar year. Several weapons may be designated by the same year, for example weapons designated Type 56 include Chinese-made copies of the Soviet AK-47 assault rifle, SKS carbine, RPD machine gun, ZPU-4 quad antiaircraft machine gun, and RPG-2 antitank projector which were all standardized in 1956.

Before and during World War II most European countries used the term "model" or equivalent to designate weapons followed by the two- or four-digit year of adoption. It was common for modifications of weapons to be identified by having the modification year appended; take for example the M1891/10 and M1891/30 which indicates that the basic M1891 rifle had been modified in 1910 and 1930. The modification could be minor alterations to the original weapon or could be significant changes resulting in a different newly manufactured weapon.

This table shows how various European nations designated various weapons.

Country	Abbreviation	Model	Example
Czechoslovakia	vz.	*Vzor*	vz.26
France	M *or* Mle	*Modèle*	Mle 1935 *or* M 35
Hungary	M	*Modell*	42M
Italy	M. *or* Mod.	*Modello*	Mod. 35 *or* M. 35
Poland	wz.	*Wzór*	wz.24
Russia	*Обр*.	*Образе́ц*	*Обр*. АК-47г
Scandinavia (most)	m/	*model* or *modell**	m/45b
Spanish (speaking)	Mod. *or* M	*Modelo*	Mod. 1908 *or* M65

* Norway also uses NM = *Norsk Modell.*

It must be understood that there will always be exceptions; different designation systems were used by any given country over time, and even two or more designation systems could be in use at the same time. Additionally, developmental, project, and factory designations may be different from the official military designations, while there may also be different export model designations.

Why do JAPANESE WEAPON DESIGNATIONS have a parenthesized year following the "Type" number?

Japanese weapons and equipment were designated differently depending on the era in which they were adopted. These eras were not named after the residing emperor, but with a name meant to describe the regime's supposed ambience. During the Meiji Era (Enlightened Rule) (1868–1912) and Taisho Era (Great Righteousness) (1912–26) the year numbering began anew with the accession of the new emperor. Japan had adopted the Western solar, or Gregorian, calendar on January 1, 1873 to replace its lunar calendar which resulted in dates being advanced three to six weeks. Weapon designations were still numbered according to the year of the regime, so for example we have the Taisho Type 10 hand grenade which was adopted in the 10th year of the Taisho Era (1921).

The Japanese calendar began in the Western year of 660 BC with the founding of the Japanese Empire. This practice was changed during the Sowa Era (Enlightened Peace) (1926–89) with the accession of Emperor Hirohito. The Japanese calendar year was used to designate weapons and equipment and "Sowa" was not included in the designation as "Meiji" and "Taisho" had been. Prior to 1941, only the last two digits of the Japanese year were used in designations, thus a weapon adopted in the Japanese year 2599 was shown as Type 99 (1939 in the Western calendar). Weapons adopted in Japanese year 2600 (1940) were designated Type 100. From 2601 (1941), only single-digit year designations were used, for example Type 1 (1941). Either way, it is important to remember that Japanese years do not coincide with Western dating, but subtracting 660 from the Japanese year can determine the Western year (2605 – 660 = 1945). It was for this reason that during the war Allied Intelligence habitually identified weapons

with the Japanese year – the Type designation – followed by the Western year in parentheses, e.g. Type 97 (1937).

After World War II Japan used the Western calendar to designate weapons, the 7.62mm Type 64 rifle adopted in 1964, for example. The term "type" was used to translate the Japanese ideograph *shiki*– 式. Some reference books and contemporary intelligence documents translate this as "model," but "type" is correct. Some collectors show Japanese designations as, e.g, "T97" rather than Type 97, but this is confusing to some.

A brief history of the "ASSAULT RIFLE"

Assault rifles are generally defined as a compact rifle capable of semi- and full-automatic fire with an intermediate-sized cartridge (smaller than a standard rifle/machine gun cartridge, larger than a pistol/submachine gun cartridge) and a high-capacity magazine (generally 20 or 30 rounds). It is a weapon intended for placing a high volume of fire on targets at close ranges, so long-range accuracy is not a concern. The antigun lobby points out that assault rifles have high magazine capacities, pistol grips, and flash suppressors, and a bayonet can be fitted. These features do not necessarily make a particular weapons an assault rifle, but are just common military fittings.

While there were a few experimental weapons that saw combat field testing, the first widely issued assault rifle was the **German MP.43**, which set the standard for the definition. This compact, but comparatively heavy, 1943 machine pistol (*Maschinenpistole*), the German term for a submachine gun, fired a special 7.9x33mm *kurz* (short) cartridge, was semi- and full-automatic, and had a 30-round magazine. While it had a pistol grip, it lacked a flash suppressor and bayonet lug. An improved version, the **MP.44**, began production in July 1944 and was soon redesignated the **StG.44** – *Sturmgewehr* (assault rifle).[1] Allied propaganda of the period reported the name change to be only a German morale-building effort, propaganda in its own right. However, the actual reason for the change was to differentiate the new type of weapon from traditional machine pistols (MP.38, MP.40), all of which fired 9mm pistol rounds, so that there would be no confusion over ammunition resupply. It also more precisely described

the weapon's role. Developmental predecessors of the *Sturmgewehr* were designated *Machinenkarabiner* (MKb. – machine carbine).

A popular myth maintains that Adolf Hitler (1889–1945) did not like the 7.9mm machine carbines, the predecessors of the MP.43 and MP.44, and forbade their production. What was likely to have actually occurred was that Hitler directed that the development of new weapons was to halt and that arms production would concentrate on existing machine pistols and machine guns. He feared the manufacture of new weapons would slow production rates of proven standard arms while offering only marginal improvements. Production lines would also have to be converted to new weapons thus further interrupting production. There were also probably concerns about introducing a new type of ammunition, although the same machinery could be used to manufacture the 7.9x33mm as the 7.9x57mm. It was thought that Hitler was also concerned that the introduction of a new cartridge would burden the already overstretched logistics system, or more likely his advisors voiced this concern. Since the MKb.42 machine carbine prototypes had been so well received during combat testing on the Eastern Front, the *Heerswaffenamt* (Army Weapons Office) decided to redesignate them "machine pistols" and go ahead with production. The myth continues that Hitler was "furious" when he found out that it had been fielded but there is no evidence of this. Hitler finally did approve its production to eventually result in its redesignation as a *Sturmgewehr.* Again, the myth claims Hitler bestowed the "assault rifle" designation himself, but this too is highly doubtful. He may have signed the order, but the designation was probably proposed by the *Heerswaffenamt.*

After the war, East Germany continued to use the term *Maschinenpistole* (MPi) to designate their versions of AK assault rifles, e.g., MPiK – *Maschinenpistole Kalashnikov.* West Germany, and now reunified Germany, simply calls them "rifles" (*Gewehr*), i.e., G3. The Czechoslovaks used the term *Samopal* (*Sa.* – "automatic firearm"). The Russians simply call them "automatics" or "automats"; AK – *Avtomat Kalashnikova.* Their nickname for an **AK Kalashnikov** is *"Kalash."* It has been known for boys in civil war-torn African countries to have been named "Kalash" as the "people's rifle" has had so much of a cultural impact; regardless of its value as a military weapon its cultural influence is immense. In various socialist/communist countries the Kalashnikov has even appeared on the national coat of arms, flags, military decorations, postage stamps, and

currency. In Mexican crime circles the AK is known as the *cuerno de chivo* – goat horn – because of its distinctive curved magazine.

The AK-series assault rifles are arguably the most readily identifiable and the most produced assault rifles ever. Invented by tanker Senior Sergeant Mikhail Timofeevitch Kalashnikov (later Major-General), it set the standard for assault rifles. (Kalashnikov has even had a vodka brand named after him.) The media refers to it as both the "AK-47" (regardless of variant or actual model) and the "Kalashnikov" depending on what the locals call it in the region the media is reporting in. Most AKs in use today are actually AKMs, not AK-47s.

The various antigun groups definition of what an assault rifle is has little bearing on what an assault rifle really is. The assault rifle description has little to do with its appearance, but rather its role. In fact most countries do not even use the term; technically the M16 rifle is an assault rifle, but officially it is a "rifle, caliber 5.56mm, M16" and the term "assault rifle" is not found in any field or technical manual on the weapon. Even the definitive assault rifle, the first weapon held up as an example of the genre, the AK-47, is not officially designated an "assault rifle." An assault rifle may or may not have a flash suppressor, bayonet lug, pistol grip, carrying handle, folding or telescoping stock, bipod, integral grenade launcher, and may be more compact than traditional rifles. All of the above are simply standard military attachments, fixtures, or features necessary for the operation of the weapon or to improve its combat capabilities. Weapons described as an assault rifle will have some of these features, but there are two basic features that they will have:

1. **a high-capacity magazine**, usually 20 or 30 rounds;
2. *military* issue assault rifles will be capable of **selective fire**, i.e., semi- and full-automatic fire, or have a three-round burst capability rather than full-auto.

Those sold on the civilian market are semiautomatic only, lack a full-automatic or burst capability and thus do not fit the actual assault rifle definition; being instead an "assault riflelike" firearm. They are also colloquially known as "black guns" meaning those with a modern "military look," which often have black composite or plastic "furniture" (stocks,

forearms, pistol grips). Alcohol, Tobacco, Firearms, and Explosives[2] regulations also require that civilian semiautomatics cannot be easily converted to full-automatic. An "intermediate cartridge" was formerly said to be a requirement for assault rifles – a cartridge between a traditional rifle round and a pistol/submachine gun cartridge. This term is little used now as the former "intermediate cartridges" are now mostly *the* standard rounds.

Besides appearance, which some solely focus on, the real concern is that such weapons can be devastating in any shooting situation because they are semiautomatic and have a large capacity magazine. As such, efforts have been made to limit the magazine capacity of civilian semiautomation rifles. Antigun groups have also coined the term "assault weapon" with an even more nebulous definition, as they wish to ban certain shotguns and high-magazine-capacity pistols ("Wonder 9s"), which they have lumped together with selected semiautomatic rifles that look like assault rifles.

A personal note: The author is not opposed to the reasonable control of certain types of weapons. The purpose of this discussion is simply an attempt to clarify what an assault rifle actually is.

What is a SNUB-NOSED REVOLVER?

Snub-nosed or snubnosed revolvers are **compact** small-frame revolvers with 2–3in-long barrels or even less. They often have a five-round cylinder rather than the traditional six, typically have smaller, shorter grips, and newer models may be made from lightweight high-strength alloys. "Snubbies," designed for compactness, are intended to be **easily concealed** and often used by both criminals and plain clothes law enforcement officers; uniformed officers sometimes use them as backup guns. Military aviators and private citizens generally use "snubs" for self-defense. They were also known as "belly guns" as they were traditionally carried tucked into the waistband of trousers. Modern snub-noses often have special design features such as "streamlined" front sights (or removed altogether) and cartridge ejector rod housings, de-spurred ("bobbed" or "dehorned") hammers, and smaller trigger guards to help prevent them catching on clothing when drawn. While standard large-frame and smaller revolvers sometimes had the longer barrel cut down, the first purpose-made snub-

nose was produced by Colt in 1927, the **Detective Special in .38 Special**. The popularity of snub-noses slumped with the introduction of compact high-capacity semiautomatic pistols in the 1970s. However, in the 1990s there was a resurgence in their popularity owing to the passage of concealed handgun carry laws in many states of America and the limited availability of high-magazine-capacity pistols (ten or more rounds) because of the Federal Assault Weapons Ban. Revolvers too are generally safer to handle than semiautomatics.

Most gun companies producing revolvers have offered snub-nosed models with the most common being Colt, Charter Arms, Llama, Ruger, Smith & Wesson, and Taurus. The most frequently seen calibers are .38 Special and .357 Magnum, but smaller and larger caliber models are available, even .41 Remington Magnum and .44 S&W (Smith & Wesson) Special as well as various .32-caliber pieces. However, the larger calibers defeat the purpose of what most snubbies are designed for. Because of their smaller size, lighter weight, and shorter barrel, snubs generate more recoil and muzzle flash than conventional revolvers. Their realistic accuracy in close engagements is not over 20ft (6m), if that far. Probably one of the silliest looking guns seen in movies is a little snub-nose “gat” with a huge silencer screwed onto the muzzle. This is particularly silly since silencers do not work on revolvers.

Was there really a German weapon that SHOT around CORNERS?

As farfetched as it may seem, **YES**. In the early 1940s Germany began experimenting with **curved barrel** (*krummer Lauf* or *gebone Lauf*) attachments for the 9mm MP.40 machine pistol. They were also tested for the 7.9mm MG.42 machine gun and the 7.9mm MP.44/StG.44 assault rifle, with which they saw some limited combat use late in the war. There were several variants of this device, which was fitted on to the muzzle of the assault rifle and was secured by a robust clamp. The curved barrel could be oriented in any direction – right, left, up, down, in between. They were fitted with an elaborate Zeiss prismatic mirror sighting system allowing the firer to aim around corners, and the mirror sight housing was lightly armored to protect it from enemy return fire. These curved barrels were

provided with 30-, 45-, 60-, and 90-degree turns but the 30-degree was the most effective owing to it placing less stress on bullets coursing through the more radically curved barrels. (In the most curved barrels the bullets sometimes fragmented or shed their jackets.) One American report stated that test firings using a captured 30-degree barrel (the least radically curved) allowed the firer to hit a head-sized target at 328ft (100m) with four out of five shots.

The concept of course was to allow a soldier to fire around corners, and not just building corners, but from behind trees, rubble piles, over trench parapets and walls, windows, etc. The StG.44(V) had a 40-degree barrel, but a ball mounting (*Kugellafette*) for the StG.44(P) with a 90-degree barrel was designed to fit in the turret top of tanks and assault guns so enemy infantrymen attacking an AFV with hand mines and grenades could be shot off the vehicle – as such it was a close-defense weapon (*Nahverteidigungswaffe*). While seeing some combat use, mainly on the Eastern Front, they were not widely issued.

After the war the US tested a curved barrel for the .45-caliber M3A1 submachine gun ("grease gun") based on the German design, but with little success. The Soviets tested a much modified stockless 7.62mm RPK machine gun (light machine gun version of the AKM assault rifle) with a 90-degree curved barrel. This was not an attachment, but a permanent, heavily reinforced barrel for use in AFVs. The curved barrel did not prove to be effective, no matter the design. Stresses on the bullets often broke them up and the barrels wore out extremely fast. The Soviet system was not adopted.

Of course every soldier carries a weapon that can "shoot" around corners; it's called a hand grenade.

The 9MM PARABELLUM and the LUGER

Before we take a more detailed look at submachine guns we must discuss the most common cartridge for which these weapons are chambered. There

are about ten other 9mm pistol/submachine gun rounds besides the 9mm Parabellum, but when one says a "9mm" or "nine-mil" without an appended identifier, it's generally accepted one is referring to the 9mm Parabellum. The 9x19mm (.355-caliber) cartridge was developed in Germany between 1898 and 1902 by Austrian **Georg Luger** (1849–1923) and German-born **Hugo Borchardt** (1844–1924)[3] at *Deutschen Waffen-und Munitionsfabriken* (DWM) for their Luger pistol.[4] The name "Parabellum" (pronounced "para-bel-lum") is derived from the Latin quote by Roman historian Flavius Vegetius Renatus (*c.*AD 379–395), who said, *"Qui desiderat pacem, praeparet bellum"* (Whoever wants peace should prepare [for] war). (Vegetius is sometimes misquoted as saying, *"Si vis pacem para bellum"* – if you seek peace, prepare [for] war.[5]) Regardless, "Parabellum" was the DWM cable address (sort of the equivalent to the modern day Internet "url") and became the company motto. In itself "Parabellum" is not actually a Latin word, but a trademarked marketing name derived from the Latin phrase. It was not a developmental cover-name or codename as is sometimes implied.

The 9mm Parabellum evolved from the 7.65mm Parabellum (aka 7.65x21mm Luger, 7.65mm Borchardt, .30 Luger, *Patronen № 471*) developed in 1898 by Luger and Borchardt. Because of the 9mm's use in the Luger pistol it became widely known as the 9mm Luger, especially in the US. It was also used in the first submachine gun in 1917. The "Luger" designation for the 9mm has gradually fallen into disuse as the Luger pistol quietly faded from use and memory. Throughout World War II the Germans designated the round simply as the *Pistolenpatrone 08* (pistol cartridge 1908) without including its caliber. A little used abbreviation is "9mm PB" and DWM identifies it simply with a cartridge number – *Patronen № 480.*

In 1910 another version of the cartridge was developed – the 9mm Glisenti (aka 8.9mm and sometimes misspelled as "Glesenti"), an underpowered (by 25 percent) round for the Italian Glisenti Mod. 1910 pistol (known as the "Italian Luger" or "poor man's Luger" because of its superficial resemblance). The 9mm Glisenti is identified by a truncated-cone-shaped bullet and it was later used in Italian automatic weapons.

The first country to adopt the Luger was Switzerland in 1900 as the 7.65mm *Ordonnanzpistole 00* (*OP00*) – ordnance pistol – followed by Bulgaria. That same year the US Army purchased 1,000 7.65mm Lugers for field trials, but was unimpressed by the weak cartridge, frequent jamming,

sensitivity to dirt, and its cost. This was at a time when it was realized that something more powerful than the current .38 Long Colt used in service revolvers was necessary. A .45 ACP Luger was tested by the US Army in 1907, but rejected for the same reasons, except the underpowered cartridge, as the 7.65mm model. The German Navy adopted the Luger in 1904 and the German Army in 1908 producing it until 1918. Primary production resumed in 1928 and ran until 1942, although smaller numbers were still made to the end of World War II. Other countries using Lugers prior to World War II included Brazil (M1906), Bulgaria (M1900, M1906), Chile, China, Finland, France (Mle 1906), Mexico, Netherlands (P02), Norway, Persia, Portugal (M1906 M2), Romania, Russia (M1906), Switzerland (OP00, OP06), and Turkey, mostly in the 7.65mm variant, but a few countries selected 9mm.[6] Portugal was still using them into the 1980s. Most of these countries adopted the Luger, albeit often in comparatively small numbers, in the early 1900s. Scores of Luger variations were produced by five German firms as well as in Britain and Switzerland. Most were 9mm and 7.65mm Parabellum with rare models made in .32 ACP, .380 ACP, and .45 ACP.

Four unofficial titles are often heard in conjunction with Lugers. The **"American Eagle Luger"** was a 1906-production pistol made by DWM with the US Coat of Arms (eagle) on the receiver ring for the 1907 US Army trials. The **"Luger Banner"** or **"Mauser Banner"** or **"Mauser Banner Luger"** was merely a Mauser-made Luger bearing the banner-like Mauser logo on the toggle. There is nothing of special significance to note about such Mauser-made Lugers.

"Kriegshoff Lugers" were made by *H. Kriegshoff Waffenfabrik* from 1935–45. They were marked with an anchor symbol flanked by "H" and "K" on the toggle. The anchor does *not* mean they were used by the Kriegsmarine. This was the only firm producing Lugers after 1942. One will also encounter the term "Black Widow Luger" – these are Mauser-made Lugers produced in 1941–42 with a very black bluing and black plastic grips. This term is strictly a marketing ploy invented by a US surplus gun dealer and was never used by the Germans. Lugers and other German-made pistols will sometimes be encountered with plum-colored bluing, often called "red" by collectors. This was caused by "work hardening" of the steel when it was overheated during the machining process (to speed production) and when blued caused a change in the chemical process and thus the color.

Interestingly, early in World War II Australia issued some officers in its independent companies (commando-type units) with P.08s captured in North Africa and referred to them as "Pistols, Mauser" on the unit War Establishment (table of organization and equipment).

After World War I the use of the 9mm Parabellum spread rapidly and there have been more models of semiautomatic pistols and submachine guns chambered for the 9mm Parabellum than any other single cartridge. By World War II the 9mm Parabellum was the most widely used military pistol and submachine gun cartridge worldwide. "9mm Para" (a "shorthand" name) has been produced by, or for, more than 70 countries, including just about every country capable of sustaining an ammunition industry, and it has been used by many more. It is also known as the 9mm NATO as it was standardized by that coalition's handgun and submachine gun cartridge in 1962 (STANAG 4090); most NATO countries had been using it long before this standardization.

The current standard US military round is the "cartridge, 9mm, ball, M882." Military and commercial bullet types have included full metal jacket ball, armor-piercing, tracer, soft- and hollow-point, match, practice, subsonic for use in silenced weapons, and other specialized loads. Special high-velocity or over-powered rounds have been developed for submachine guns and usually should not be fired in handguns (follow warnings on cartons). In spite of the never to be resolved superiority argument of the 9mm versus .45 ACP, the "nine-mil" is going to be around for as long as there are metallic cartridge-firing handguns and submachine guns. "While a 9mm bullet may or may not expand, it is an undeniable fact that a .45-caliber bullet will never shrink" (unknown author).

"Parabellum" also designated a series of German World War I aircraft and Zeppelin machine guns, the 7.9mm MG.14 and MG.14/17, which were refined air-cooled MG.08 Maxim designs with a higher rate of fire, produced by DWM. In this case "Parabellum" *may* have been used as a cover designation during their development to lead outsiders to misbelieve the P.08 pistol was being referred to, but this has not been confirmed.

None of the foregoing should be confused with the *Kyuu Miri Parabellum Bullet* ("9mm Parabellum Bullet"), a Japanese emo,

heavy metal, post-rock band.

Why did GERMAN SUBMACHINE GUNS have 32-ROUND MAGAZINES?

Prior to and during World War II, German 9mm submachine guns, which they called machine pistols (*Maschinenpistole*), had 32-round magazines – why?

> **Simple**, because 9mm Luger pistols have had eight-round magazines since 1902 when the first Luger in this caliber was produced.

Lugers were adopted by the German Navy in 1904, with a 6in barrel, and the German Army in 1908 with a 4in barrel. Luger pistol ammunition was issued in 16-round cartons rather than in 50-round cartons as was US practice with handgun ammunition. The Luger P.08, and later the Walther P.38, were issued with two eight-round magazines (one in the pistol, one in the holster pocket; magazines were not interchangeable between the two pistols) and its bearer was issued with a 16-round carton of ammunition. The German Army adopted a 32-round "snail drum" magazine (*Trommelmagazin*) and a long-barreled (8in) Luger in 1914 equipped with an adjustable long-range rear sight and detachable shoulder stock/holster intended for artillery crews, this was known as the *Lange Pistole 08* (or the P.08/14 or P.14 or "artillery Luger"). It was also used by airmen for early pre-machine gun air-to-air combat. The *Trommelmagazin* was actually fielded in 1915 and two 16-round cartons filled the magazine. The first German, and for that matter the world's first, submachine gun or "machine pistol," the MP.18/I which was introduced in 1918, used this same magazine as it was already in production. When later German submachine guns, such as the MP.28/II, MP.34/I, MP.38, and MP.40, were developed with box magazines, they retained the 32-round capacity to be filled by two standard 16-round cartons.

Meanwhile, the US was still issuing .45-caliber ammunition in 50-round cartons for pistols using 7-round magazines and submachine guns using 20-

round, and later, 30-round magazines.

The French followed the German practice in the mid-1930s and issued the 7.65mm Lounge cartridge in 16-round cartons for use in their Mle 1935A/S pistols (eight-round) and MAS-38 submachine gun (32-round). The Japanese failed in such rationalization. Their 8mm Nambu pistol was issued with two eight-round magazines while the standard ammunition carton held 15 rounds … and there was space for a 16th round. It appears as though some bureaucrat preferred convenience of ammunition accountability over practical field use. The British issued their .38/200 Enfield revolver cartridges in 12-round cartons. Similar practices were occasionally encountered in other countries.

It is sometimes suggested that the German 32-round magazine was intentionally designed to be over-capacity and only 30 rounds were to be normally loaded to prevent straining the feed spring. This may be the case with the British Sten and Sterling machine carbines with 32- and 34-round magazines, respectively. There is no other explanation for the Sten's 32-round magaine as the only 9mm pistol used by Commonwealth forces was the Canadian-made FN-Browning No. 2 Mk 1 pistol with a 13-round magazine (Browning Hi-Power; adapted from the Belgium term *Grande Puissance* – G.P.).[7] The British issued ammunition for the FN-Browning and machine carbines in 50-round cartons so there was no reason for a 32-round magazine.

Why did some submachine guns have SIDE-FEED magazines and some light machine guns TOP-FEED MAGAZINES?

Many early German machine pistols (MP.18/I, MP.28/II, MP.34/I, MP.Erma) had magazines that were fitted into the weapon's left or right side, usually the left. British Lanchester and Sten machine carbines, Australian Austen, Japanese Type 100, and the post-World War II British Sterling submachine guns had similar **side-feed magazines**. **The reason for this was to prevent the long magazines from interfering when firing from the prone position, over trench and foxhole parapets, and from window sills.**

The German MP.38 and MP.40 had their magazines located under the weapon and were **top-feed** because they were originally **designed to be**

fired from pistol ports in tanks and other AFVs and side-feed magazines interfered with their traverse in such confined quarters. That is also why they lacked a ventilated barrel jacket and had a plastic bar attached beneath the barrel, which wedged it into the firing port. Submachine guns with left-side-mounted magazines are often depicted with the firer griping the magazine with his left hand. This no doubt was sometimes done in practice, but often these early designs did not have the most rigid magazine fittings and it was not a good idea to do this.

The Australian 9mm Owen machine carbine took this a step further with its magazine on top, which required offset sights, as did its successor, the F1 submachine gun. Many pre-war and World War II bipod-mounted light machine guns (Czechoslovak Brno, British Bren, Japanese Nambu, Indian Vickers Berthier, Danish Madsen, Mexican Mendoza, US Johnson, and others) also had top-feed magazines while the Italian Breda machine guns had side-feed magazines. If the large-capacity magazines had been fitted below the weapons they would have prevented them from being elevated when on a bipod as the butt stock had to be lowered and long magazines protruding from the bottom restricted elevation. That is why the bottom-fed US Browning automatic rifle (BAR) had only a 20-round magazine while a higher capacity magazine would have been desirable. Top magazine-fed weapons require offset sights, which of course can only be set to align with the line of fire at a pre-selected range. However, these are full-automatic bullet-sprayers intended to take out crew-served weapons, small groups of troops, and to place suppressive fire on small target areas. They need not be precision-fire to be effective.

What was a MACHINE CARBINE?

It was the **British Commonwealth** World War II **classification** for a **submachine gun**, the most common being the Sten gun-series, pre- and early-World War II Lanchester Mk I, and the Australian Austen and Owen; all 9mm weapons. At the same time the Commonwealth was using US-supplied .45-caliber Model 1928 Thompson submachine guns and they referred to it by that classification.

A “carbine” is normally defined as a short-barreled rifle. A “machine carbine” was a short-barreled weapon, but of pistol-caliber rather than rifle-

caliber so the term does not really fit the traditional carbine definition.

"Submachine gun" (SMG) describes a pistol-caliber, compact, handheld, and shoulder-fired automatic weapon smaller than the heavier rifle-caliber machine gun and automatic rifle. Occasionally the term "sub-carbine" is encountered, but it never caught on. The Germans used the term *Maschinenpistole* (MP.) – "machine pistol" – a small automatic pistol-caliber weapon with the same definition of the submachine gun. In fact, most countries use the "machine pistol" term rather than "submachine gun": Czechoslovakian – *kulometné pistole,* French – *pistolets-mitrailleur*, Italian – *pistoli mitragliatrici*, Polish – *pistolet m maszynowy*, Russian – *pistolet-pulemet*, Spanish – *pistola-metralhadoras*, Swedish – *Kulsprutepistol.* The Germans also used the designation *Machinenkarabiner* (MKb.) for the prototypes of what became the 7.9mm MP.43/MP.44/StG.44 machine pistols/assault rifles. These were the MKb.42(H) and MKb.42(W), which saw limited combat testing on the Eastern Front (the parenthesized letter identified the developers). Submachine guns in general have also been called "Tommy guns" (especially the Thompson), "gangster guns" (from the Thompson's reputation during the Prohibition gang wars), and "burp guns" (usually applied to the German MP.40 and Soviet PPSh-41, but it was used as a generic term as well).

The Commonwealth armies began to apply the "submachine gun" (also seen as "sub-machinegun") classification when new weapons were adopted after World War II, but earlier weapons remaining in use, such as the Sten, retained the machine carbine classification. Stens retained in service were redesignated in the L-series as the L50A1 (former Mk II), L51A1 (Mk III), and L52A1 (Mk V) in the late 1950s. The Australians adopted the 9mm F1 submachine gun in 1963, a new indigenous design to replace the Owen machine carbine. The British Sterling L2-series has been designated both machine carbine and submachine gun depending on when specific variants were adopted. The first model was adopted in 1953 and was initially known as the Patchett after George W. Patchett (1901–78), chief designer of the Sterling Armament Company, who designed the prototype in 1944.[8] The Canadians designated the Sterling the C1 submachine gun. Sterlings were phased out in 1988 along with the FN L1A1 self-loading rifle (SLR) by the 5.56mm L85A1 individual weapon and L86A1 light support weapon.

Sten gun, Bren gun, Besa gun, Austen gun, Owen gun; WHAT WERE THOSE NAMES DERIVED FROM?

These were terms derived from contracting words to identify World War II British automatic weapons; Australian in the case of the Austen and Owen, though the latter was not a contraction.

- The 9mm Mk I through Mk VI **Sten guns** were machine carbines. “St” was derived from the two designers, Major Reginald V. Shepherd and Harold John Turpin, and “en” from Enfield Armory where it was designed in 1940/41 as the N.O.T. 40/1. The Mk I did not see combat. Germany recognized the Sten could be produced rapidly at low cost and Mauser turned out a rough copy called the MP.3008 in January 1945 as a last ditch emergency weapon. Its main difference from the Sten Mk II was that it used an underside-fitted 32-round MP.40 magazine rather than the Sten’s side-feed. Mauser had earlier produced, at great expense and secrecy, an exact copy of the Sten Mk II complete with British markings known as the *Neumünster Gerät* (New Munster Device), a cover-name. It was believed to have been intended for clandestine operations which were never conducted. After the war the Sten was gradually replaced by the Sterling 9mm L2-series submachine guns and was gone by the 1950s. Nationalist China made some copies of the Sten Mk II as the Type 38 (1949) in 1950. In World War II the Polish Home Army clandestinely produced a modified copy of the Sten Mk II, the *Polski Sten*, in local factories with British markings to conceal its origins in order to prevent the Germans from searching for an in-country factory. A much modified version was also made in small numbers called the *Błyskawica pistolet m maszynowy* (Lightning machine pistol).

- The .303in Mk I through Mk IV **Bren guns** were bipod-mounted light machine guns serving as section (squad) automatic weapons and adopted in 1935. “Br” means *Brno*, for the original Czechoslovak design firm of *Zbrojovka Brno,* and “en” means Enfield Armory where the design was refined from the Czechoslovak 7.92mm vz.26 machine gun. Brens were also produced in Australia, Canada, and India. Unlike the Sten gun, the Bren remained in limited use into the 2000s in updated form as the

7.62mm NATO L4A1/A2/A3/A4/A5/A6/A9 (the proposed L4A7/A8 was not produced). Taiwan made a .30-06 copy called the Type 41 from 1949. Having been first produced in 1937, the Bren is probably the longest serving light machine gun around. It is still offered by the Indian Ordnance Factories as the 7.62mm 1B light machine gun. The Bren was an excellent weapon and was even modified as a spotting gun for the 120mm L4 Mobat recoilless rifle. There were only two real complaints of the Bren: 1) the .303 rimmed cartridge – less than ideal for any automatic weapon – it had to be carefully loaded into the 30-round magazines with the recommended 28 rounds ensuring the rims did not overlap to prevent feed jams, and 2) it was *too* accurate, even with its offset sights to accommodate the top-feed magazine, which provided too small a beaten impact zone to effectively take out crew-served weapons and small groups of enemy, which is the primary role of squad/section light machine guns. Of course there could be worse complaints of a weapon. The weapon was so important to the British that they fielded a series of small, open-topped, full-tracked vehicles to transport Brens and other crew-served infantry weapons – including Boys antitank rifles, PIAT (standing for the British Projector, Infantry, Anti-Tank) antitank projectors, mortars, and Vickers machine guns – and the "universal carrier" commonly became known as the "Bren gun carrier."[9]

- The **Besa gun** referred to the 7.92mm Mk I through Mk III and 15mm Mk I coaxial and bow machine guns adopted for use in Commonwealth tanks in 1937 and 1938, respectively; production did not begin until 1939. The 7.92mm Besa Mk III high-rate firing gun was also used as a quad antiaircraft machine gun on Humber armored car and Vickers light tank chassis. They were produced under license from the Czechoslovak Brno 7.92mm vz.37 (aka ZB53) and 15mm (0.59inch) vz.38 (aka ZB60) machine guns. The 7.92mm round was used, the same as the 7.9mm used in German small arms, in order to speed up production rather than converting the guns to .303inch, which would have required considerable redesign. "Besa" is derived from Birmingham Small Arms Company (BSA). After the war the Besa guns were replaced by .30inch M1919A4/A5 Browning and later by 7.62mm NATO L8A1 and L37A1 (FN MAG) tank machine guns.

- The Australian-made **Austen gun** was the 9mm Mk 1 machine carbine, a much modified Mk II Sten gun deriving some influence from the German MP.40 and produced between 1942 and 1944. “Au” is reflective of its Australian origins, while “sten” refers to its modification of the Sten. It was described as an “up-market Sten gun.” Its side-mounted 32-round magazine and exposed bolt were easily infiltrated by dirt. It was issued only to militia and second-line units remaining in Australia, and was placed in reserve after the war.

- The OMC or **Owen gun** or 9mm Mk 1-42 (metal skeletal stock), Mk 1-43 (wooden stock), and Mk 2 (lightened wooden stock) Owen machine carbines (OMC) were Australian-made weapons distinguished by their vertical top-feed 30-round magazines. The Australian Army replaced its US .45-inch M1928A1 Thompson submachine guns (which were transferred to the Royal Australian Air Force and its Airfield Defence Guard) with the almost unjamable OMC in May 1943. It was designed before the war by Evelyn “Evo” E. Owen (1915–49).[10] Noted for their reliability and called the “Digger’s Delight,” Owen guns remained in use through the Malayan Emergency, Sarawak Confrontation, and Korean and Vietnam Wars. The Owen began to be replaced tactically by the 9mm F1 submachine gun and the M16A1 rifle during the Vietnam War.

What was the world’s FIRST SUBMACHINE GUN?

The very first true submachine gun was the **German Bergmann 9mm MP.18/I** machine pistol developed in 1917 and issued the next year. It was designed by Louis Schmeisser, but is not called a “Schmeisser.” It was referred to as a “Bergmann” as it was produced by *Theodor Bergmann Waffenbau A.G.* The MP.18/I had a wooden stock, a ventilated barrel jacket, and a 32-round “snail drum” magazine on its left side, the same as used in the “artillery Luger” pistol. Some 35,000 were produced and mainly used by special assault troop (*Sturmtruppen*) units. It saw wide use by the German police after the war. The basic design was improved resulting in the MP.28/II and MP.34/I, which were used by the German Army and Police, even after the adoption of the MP.38 and MP.40. Bergmann-designed machine pistols were exported worldwide before the war for military and

police use and Japan produced a version, the 8mm Type 100 (1940), which saw very limited use.

It is often claimed that the Italian Villar Perosa (V.P.) 9mm Glisenti machine gun of 1915 was the first "submachine gun." It was also known as the "Revelli" after its designer and also as the "Fiat" and "OVP" (*Officini di Villar Perosa*), after the two Italian manufacturers. It was also made by a Canadian firm for the Italians. Models included the Mod. 1915, 1916, and 1917 with minor differences. The V.P. was first employed as an observer's gun on aircraft, on armored cars, and naval small craft, but was too underpowered and short-ranged for these roles. It saw its first ground combat in May 1917 and was also mounted on motorcycle sidecars. The 9mm Glisenti was an underpowered 9mm Parabellum round originally used in the Glisenti Mod. 1910 pistol. Why such an underpowered round was selected is a mystery as there were more powerful 9mm rounds available. While the weapon was pistol-caliber, full-automatic, short-barreled, and fed by 25- or 50-round box magazines, it was not a true shoulder-fired submachine gun effortlessly operated by one man by any stretch of the definition. It was a twin-barrel light assault machine gun originally fitted in a shield that doubled as the mount; the Italians redundantly called it a *pistola mitragliatrice* (machine gun pistol); "pistol" as it fired a pistol cartridge. It was later provided with a bipod to make it somewhat more mobile. The OVP was fitted with dual thumb-operated triggers and spade grips, and lacked a shoulder stock, which hardly conjures up the image of the traditional submachine gun. It weighted 14lb, 4oz (6.5kg), without the even heavier shield mount or bipod and magazines. The official rate of fire was 1,200–1,500rpm *per barrel.* Even 50-round magazines would empty in the blink of an eye. The 25-round was most commonly used in the ground role. The magazines had to be changed 12 times in one minute of high-rate firing. A 28-man section was provided with alpine infantry (*Alpini*) battalions to operate *two* guns as an alternative to heavy supporting machine guns; such a large number of troops being necessary to carry ammunition in rugged terrain. Later, three such sections were allocated, one per rifle company, for fire support in lieu of heavier tripod-mounted machine guns. The regular infantry was not interested in the underpowered weapon. A shield or bipod-mounted, twin-barrel, fire support weapon manned by a 12-man crew can hardly be described as a "submachine gun." Granted, there

were a few fitted with a crude wooden shoulder stock, but this was a rare field expedient.

What was the "BROOMHANDLE MAUSER"?

Waffenfabrik Mauser is mainly known for its excellent rifles, but the firm designed many other weapons. One of the most distinctive was the C96 self-loading pistol, a weapon with a bewildering host of designations and names. The "C" means *Construktionsjahr* (year of construction), an early German weapons designation. It was designed by the brothers Fidel, Friedrich, and Josef Feederle in 1895. The C96 was originally designated the P.7.63 (Pistole 7.63mm) and informally called the *Feederle Pistole.* Many sources claim that Paul Mauser renamed it the "Mauser Military Pistol" (*Mauser-militär-Pistole*), but as far as can be determined it never bore this name (it is not found so-named in Mauser catalogs). The C96 was a large semiautomatic pistol, though with a surprisingly narrow width, with an unusually designed pistol grip similar to a small hand-broom or whiskbroom handle. Most automatic pistols contain the magazine in the grip, but the C96 had its magazine forward of the trigger. C96s had a slightly longer than usual barrel and an adjustable, comparatively long-range tangent rear sight. It was provided with a large wooden holster which completely contained the holstered pistol, the hinged butt plate serving as a trapdoor. The holster doubled as a detachable shoulder stock in effect making the C96 a shoulder-fired personal defense weapon. This made it somewhat more of an offensive weapon when compared to other handguns. It was unique too in that no screws or pins were used in its construction. Most "Broomhandle Mausers" fired the 7.63x25mm Mauser (aka .30 Mauser, .303-inch Mauser [UK])[11] originally designed for the Borchardt pistol, the predecessor of the Luger, in 1893. While the round was the handgun top-velocity achiever, until the .357 S&W Magnum was introduced in 1935, and accurate at longer ranges than most contemporary pistol rounds, its 88-grain bullet lacked stopping power.

Sales were initially weak, but eventually picked up and the C96 was used by a large number of countries, however, it was never adopted as *the* official handgun of any country; it was too expensive and large. Instead is was used as a supplementary or special purpose weapon by the armed

forces or police of Bolivia, China, Finland, France, Germany, Indonesia, Italy, Norway, Persia, Russia, Spain, Turkey, and others. Some were made under license in Spain (Astra Modelos 900 through 903) and China (copies produced by many firms from the 1920s to the present day). Cavalrymen found it a more versatile mounted weapon than a normal handgun. Mausers saw worldwide service from the turn of the century through World War II and were also sold commercially (young Winston Churchill, 1874–1965, used one in the Sudan in 1898 and as a war correspondent in the Second Boer War).

There were many variants, up to 30, with different barrel lengths, magazine capacities (6-, 10-, 20-, 40-round), fixed and detachable magazines, and different calibers (7.63mm Mauser, 7.65mm Parabellum, 8.15mm Mauser, 9mm Parabellum, 9mm Mauser, 9mm Largo (aka Bergmann), .45 ACP). A small number were made with longer barrels and provided wooden forearms as a form of "carbine-pistol." An updated version appeared in 1930 and was known as the *Modell 1930* or M30, the *Mauser-selbstlade-Pistole* (Mauser self-loading pistol). Collectors sometimes give model numbers to variants for identification convenience such as M1896, M1899, M1902, M1908, M1912, M1916, M1930, and M1932, but few of these were official Mauser designations. German production ceased in 1936.

Besides being called the "Broomhandle Mauser" in English-speaking countries, there were other nicknames. In Germany it was known as the *Kuhfusspistole* (cow-foot pistol). The 7.63mm "Bolo Mauser" was a small-frame model made for Russia with a shorter barrel and smaller grip. "Bolo" was short for "Bolshevik," but "Bolo" is sometimes loosely, and incorrectly, used to describe any C96-type pistol. The "Red 9" (*rot neun*) was procured for the German Army in 1916. It was so named because of the red-painted "9" cut into the pistol grips so that 7.63mm ammunition would not be fired in it; the smaller round will chamber in 9mm Parabellum weapons. World War I models were also called the *Neues Sicherung* (New Safety) and marked "NS" on the hammer. The Chinese called it the "box cannon" (*hézipào*) as it was carried in a wooden box-like holster-container. Another common Chinese name is *shansei* (meaning unknown). The Irish Republican Army (IRA) referred to it as "Peter the Painter," named after the Latvian revolutionary gangster, Peter Piaktow, active in the 1900s. In 1932 a German selective-fire version was produced, the 7.63mm *M712*

Schnellfeuer-Pistole (rapid-fire pistol); aka "M1932." These were also classified as a *Reihenfeuerpistole* (literally, sequential-fire pistol). A number of these full-automatic pistols were purchased by the Luftwaffe in 1940 for issue to bomber crews, presumably as survival and self-defensive weapons. It was also used by the Waffen-SS, which used just about any arms it could lay its hands on. (Only a few high priority Waffen-SS divisions received high-quality standard equipment. Most made do with Czechoslovak and other captured/impounded European ordnance.)

Since 1934 US firearms laws prohibited simultaneous ownership of pistols accepting detachable shoulder stocks and the stocks themselves as they were classified as "short-barreled rifles" being under the 16-inch legal rifle barrel length, unless a US$200 tax was paid and they were registered. This no longer applies to such weapons as the "Broomhandle Mauser," "artillery Luger," and certain FN-Browning Hi-Power pistols, which are now permitted under the Curio and Relic Firearms Regulation of 1985.

How are WEAPON CATEGORIES defined?

Many people like to put every weapon into a specific category or are under the impression that there are specific hard and fast definitions for each category and subcategory of "small arms" – generally defined as weapons under 15mm (.59-caliber). Definitions of weapon categories are very imprecise and there are many examples of weapons that are difficult to place in one category or another or could fit in two or more categories. Official terminology can also be misleading or indifferent. While some folks anguish over whether a particular weapon is a heavy, medium, light, or general-purpose machine gun, the official designation is more often simply "machine gun."

In World War II the British called their water-cooled .303-inch Mk I Vickers gun a medium machine gun (MMG) while the Americans called their water-cooled .30-caliber M1917A1 Browning a heavy machine gun (HMG). Both were virtually identical in general description, capabilities, and role, and weighed 41lb (18.6kg) when filled with water. During World War II the US used the M1918A2 Browning automatic rifle (BAR – original Winchester factory designation was "G18M Browning light machine gun"), M1922 Browning machine rifle, and M1941 Johnson light

machine gun. All three were light squad automatic weapons, fired from the shoulder or a bipod, .30-caliber, and fed by 20-round magazines. As for weight they were 19.4, 19.2, and 13lb, (8.8, 8.75, and 5.9kg) respectively. For all practical purposes they provided the same capabilities. The M1941 Johnson did differ in that it had a quick-change barrel and has been called "an automatic rifle disguised as a machine gun." Any one of these three weapons could have been called an automatic rifle, machine rifle, or light machine gun. Today they might be called squad automatic weapons (SAW) or light support weapons (LSW).

Two very similar weapons may have been assigned different designations simply to differentiate them or because classification or designation preferences changed over the years. The Lewis machine gun was originally called the "Lewis automatic machine rifle." The term general-purpose machine gun (GPMG)[12] came from the British, specifically the 7.62mm L7A1 FN adopted in 1960. More accurately it came from the French *Mitrailleuse d'Appui General* or "general purpose machine gun." It is defined as a multipurpose weapon capable of being used as a shoulder- or bipod-fired machine gun that can also be fired from a tripod; an effort to make a two-in-one weapon filling both the light and heavy machine gun (sustained-fire) roles. The term GPMG is often attached to the US 7.62mm M60 machine gun, but GPMG is not an official US term; the M60 is designated simply "machine gun, 7.62mm, M60."

The GPMG concept was actually developed by the Germans prior to World War II and seen in their common forms as the 7.9mm MG.34 and MG.42 machine guns (*Maschinengewehr*), what they called an *Einheitsmaschinengewehr* (universal machine gun). The Germans used the same machine guns in both the light (*leicht*) and heavy (*schwer*) roles. The German terms had nothing to do with the actual weight of the *Kaffeemühle* (coffee-grinder) as the Landser called it.[13] Machine guns in the light role were issued to rifle squads and fired only from the shoulder and bipod by a three-man crew provided with five drum magazines with 50-round belts, two 300-round belts in boxes, and two spare barrels. In the heavy role the same guns were used for long-range, sustained supporting fire and assigned to battalion machine gun companies. They were provided with a recoil-damping tripod, long-range optical sight, several 300-round belts in boxes, three or four spare barrels, and manned by a crew of six. Both the MG.34 and MG.42 were used in either role. There were no differences between the

light and heavy guns themselves, just the roles in which they were employed and their accompanying equipment.

All in all the designations assigned to weapons are subjective and often two or more designations can be tagged on a given weapon. Rather than overly concerning oneself with what unofficial category one thinks a weapon should be categorized as, it might be better to simply go with the official designation even if it may not fit one's notions as to what it "should" be. Most machine guns are officially designated just that, a "machine gun," and are not prefixed with heavy, medium, light, or general-purpose.

There are of course many small arms categories, subcategories, and specialist categories. The following list includes the most common basic small arms categories, i.e., weapons under 15mm (.59-caliber). Other less conventional descriptive designations are often assigned to weapons today, but rather than attempting to create a new category of weapon these are actually promotional designations and an effort to make the weapon standout among competitors as being more "unique." The following list of military weapons designations is by no means complete.

- pistol
- revolver
- rifle
- sniper rifle
- designated marksman rifle (DMR)
- enhanced battle rifle (EBR)
- match rifle
- carbine
- submachine gun (SMG)
- machine pistol (MP.)
- machine carbine
- personal defense weapon
- trench shotgun
- riot shotgun
- combat shotgun

- assault rifle
- self-loading rifle (SLR)
- automatic rifle
- squad automatic weapon (SAW)
- light support weapon (LSW)
- machine rifle
- light machine gun (LMG)
- medium machine gun (MMG)
- heavy machine gun (HMG)
- general-purpose machine gun (GPMG)
- antiaircraft machine gun
- tank machine gun
- aircraft machine gun
- antitank rifle
- anti-materiel rifle

What were “DITCH GUNS?”

In Vietnam, motor transportation companies conducting long-haul combat convoy missions found themselves in need of up-armored and armed escort vehicles. These convoys supplied widespread US bases throughout the country. The machine gun-armed jeeps equipping Military Police escort units often proved inadequate. First 2½-ton cargo trucks were provided with armor protection and two to four .50-caliber machine guns, one or two 7.62mm M60 machine guns, and occasionally a 7.62mm M134 Minigun for suppressive fire when the enemy executed ambushes. The deuce-and-a-halves proved underpowered and insufficiently robust for the off-road weight of armor, guns, and ammunition, and wear and tear. Five-ton cargo trucks were subsequently converted. During ambushes the Viet Cong would sometimes attempt to move in close, into the roadside ditches, and, so to speak, “hug” the gun trucks and attack them with demolition charges, grenades, and RPG antitank projectors. The armed trucks’ machine guns could not be depressed sufficiently to engage the enemy at pointblank ranges. To counter this, gun trucks carried a variety of close-defense

weapons referred to as “ditch guns.” These included M60 machine guns fired in the handheld mode, 40mm M79 grenade launchers (usually one per truck), 12-gauge shotguns firing buckshot, 7.62mm M14 and 5.56mm M16A1 rifles, and .45-caliber M3A1 “grease guns” as well as fragmentation hand grenades.

What was the MAXIM gun?

From the turn of the century through World War II the Maxim machine gun was one of the most widely used ground heavy machine guns in the world – often known as the “Devil’s paintbrush.” It was not withdrawn from Commonwealth service until 1968, at least by the Australians who still used it on a limited basis. American Hiram S. Maxim (1840–1916), emigrated to Britain and was naturalized in 1888. Maxim was visiting the Paris Electrical Exhibition in 1881 where an American told him, “If you want to make a lot of money, invent something that will enable these Europeans to cut each other’s throats with greater facility.” He began work on a machine gun design and his firm was bought by Vickers in 1896 to become Vickers Sons and Maxim after the British Army adopted his weapon. It soon gave the British Tommy a considerable edge over native hordes and rebels resisting the encroachment of progressive civilization. Hundreds of the unenlightened could be mowed down with astonishingly efficiency, and all the while the British remained in relative safety. Maxim was knighted in 1901. Coincidently, he was the inventor of a resetting mousetrap (*not* the common snap mousetrap still in use today as is often reported) and the first effective firearm silencer. Some of his early guns were air-cooled, but the stereotypical Maxim was a water-cooled gun. There were also air-cooled aircraft versions. Britain first adopted the Maxim in 1891, Germany in 1894,[14] the US in 1904 as one of the replacements for the Gatling gun, and Russia in 1905. Many other countries would adopt the Maxim or its Vickers variants: Austro-Hungary, Belgium, Bulgaria, Chile, China, Czechoslovakia, Estonia, Finland, France, Greece, Italy, Japan, the Netherlands, Peru, Portugal, Serbia, Switzerland, Turkey, and Yugoslavia in calibers ranging from 6.5mm to 13.2mm in scores of models. From 1912 it was known as the “Vickers” in Commonwealth service after the manufacturer. In Germany it was known as the *Maxim-Maschinengewehr*

and, contrary to popular belief, was not called the “Spandau,” its principal manufacturing arsenal, by the Germans. “Spandau” was a label coined by the Tommy as it was predominately marked on the weapon. The Russians called it the *Pulemyot Maxima* or *Pulemet Maksima* (PM – Maxim machine gun). Water-cooled machine guns fell from use after World War II being too heavy for the more agile infantry tactical concepts and the introduction of improved supporting weapons. The British officially phased out the Vickers .303 Mk I medium machine gun in 1968.

SPECIFICATION:
Vickers Maxim

Caliber: 0.303in
Operation: short recoil
Feed: 250-round fabric belt
Cyclical rate: 450–500rpm
Length: 45.5in (1,155mm)
Barrel length: 28.5in (723mm)
Rifling: 4 grooves, r/hand
Weight (gun): 33lb (15kg)
Weight (tripod): 50lb (22.7kg)
Muzzle velocity: 2,240ft/sec (682m/sec)

Blood thought he knew the native mind;
He said you must be firm, but kind.
A mutiny resulted.
I shall never forget the way
That Blood stood upon this awful day
Preserved us all from death.
He stood upon a little mound
Cast his lethargic eyes around,

> And said beneath his breath:
> "Whatever happens, we have got
> The Maxim Gun, and they have not."
>
> – Hillaire Belloc, *The Modern Traveller,* 1898

What was the CAR-15?

CAR-15, pronounced "Car-fifteen," means **Colt Automatic Rifle Model 15**, which is the general early commercial term for Colt-made weapons based on the M16 rifle, itself derived from the ArmaLite AR-15 rifle.[15] It was also known as the "Colt Commando" or "shorty 16." The weapon, or actually weapons, commonly referred to as a CAR-15 in the US armed forces were the 5.56mm XM177-series submachine guns mainly used by Special Forces reconnaissance teams, Mobile Strike Forces (MIKE Forces), and some long-range patrol (LRP) units in Vietnam. Production commenced in 1966 and fabrication of the most widely used model, the XM177E2 (Colt Model 629), ceased in 1970. Earlier models were the XM177 (Colt Model 610) and XM177E1 (Colt Model 609). The Air Force versions were the GAU-5/A (Colt Model 649), GAU-5/A/A (Colt Model 630), (Colt Model 629 – XM177E2), and GAU-5/P (Colt Model 610 – XM177)[16] and were used into the 1980s by the Security Police. Many of these were later upgraded to the GUU-5/P with 14.5-inch barrels, birdcage suppressors, and rifling for the new M885 ammunition. The main differences among the many Army and Air Force versions were barrel length, flash suppressor design, and with or without a forward assist device (ensuring positive bolt-lock). These weapons were characterized by a short barrel and handguard, telescoping stock, and a large, heavy flash suppressor or moderator. This 4.48in (114mm) long flash suppressor was often called a "sound suppressor," another myth, and was designated as such by the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF). It does reduce the sound, but only to the decibel level of the standard long-barrel M16A1 rifle for hearing protection reasons. It does not reduce sound as do other silencers. It was simply a length of solid steel round stock with a smoothbore and angled holes drilled near the muzzle for muzzle blast relief

plus there were chambers inside into which gas was funneled. There were no buffers or sound-absorbing materials involved. XM177E2s were withdrawn from use and in the late-1970s the new Ranger battalions received some commercial Colt Model 653s, sometimes called the "Colt Commando," with short barrels and telescoping stocks, but with standard M16A1 "birdcage" flash suppressors. The 5.56mm M4 carbine was adopted in 1997 and is a short-barreled version of the M16A2 rifle with a telescoping stock and standard flash suppressor. The XM177-series concept was the forerunner of today's M4 and M4A1 carbines. "Carbine" is a more appropriate term for this type of weapon, firing a rifle cartridge, rather than "submachine gun," which is defined as a pistol cartridge-firing automatic weapon.

FACT:
A 2002 *Washington Post* article discussing weapons used by Special Forces in Afghanistan reported that the M4 carbine was called such because it was the fourth iteration of the M16 rifle (presumably interpreted as M16, M16A1, and M16A2). This is completely incorrect. Actually its designation reflects the fact that it is the fourth model of carbine adopted by the Army since just before World War II. These included the M1 semiautomatic carbine (the M1A1 had a folding stock), M2 semi- and full-automatic, and the M3, an M2 carbine mounting a first-generation infrared M1 or M3 "sniperscope" or "snooperscope."

What was the SWEDISH-K?

This was the Swedish **Carl Gustav 9mm m/45b submachine gun** developed at the end of World War II. The "K" is derived from *Kulsprutepistol* (Kpist.), Swedish for "machine pistol." "Swedish-K" or "K-gun" was a nickname bestowed by US Special Forces, which used CIA-supplied Carl Gustavs early in the Vietnam War. They also saw limited use by the SEALs (Sea, Air, Land; the US Navy's special warfare force). Military Assistance Command, Vietnam-Studies and Observation Group (MACV-SOG) replaced the "Swedish-K" in 1968 with the 5.56mm

XM177E2 submachine guns to standardize ammunition and magazines, although other weapons continued to be used for special purposes.

Carl Gustav is the name of the manufacturer – *Carl Gustav Stads Gevärsfaktori* – and is sometimes misspelled as "Carl Gustaf" or "Karl Gustav" (from which some assume the "K" was derived). "Carl Gustav" was the commercial marketing name. Sweden used it into the late 1990s. It was an excellent submachine gun for its time and much modified copies were made in Indonesia (PM Model VIII) and the US (Smith & Wesson Model 76 and MK Arms MK 760), and a direct copy by Egypt (Port Said Model and a simplified Akaba Model). Japan produced the SCK 65 and SCK 66 (SCK = Shin Chuo Kogyo manufacturing company) used by their Self-Defense Force. In protest against the Vietnam War, Sweden implemented an arms embargo against the US in 1966 and this included Carl Gustavs. This resulted in the S&W Model 76, which saw some use by Navy SEALs as the Mk 24 Mod 0. A US private venture version was the Stemple 76/45, a .45 ACP cross between the S&W Model 76 and the m/45b. A weapon similar to the m/45b was developed by *Husqvarna*, the *Kpist. m/44,* which was adopted and produced by Denmark as the *Maskinpistol m/49.* There it is known as the "Hovea," the Danish pronunciation of "HVA" (*Husqvarnas Vapenfabriks A.B.*).

A few interesting points about the Carl Gustav.

- The m/45b was painted with a gray-green enamel and if scratched or chipped it was merely repainted or touched-up.
- Parkerized versions were also made.
- Some m/45 parts are interchangeable with the Finnish Suomi m/31.
- The m/45S suppressed version possessed an integral silencer.
- Besides the m/45's standard 36-round magazine it could accept the 24- and 40-round magazines of the Czechoslovak 9mm vz.23 and vz.25 submachine guns.
- The Finnish Suomi m/31 and m/44 *konepistoolit* submachine guns' (and the Swedish-made version, the m/37-39) 36-round magazine was also interchangeable with the Carl Gustav's.
- The original m/45 had a removable magazine guide allowing it to use the Suomi's thicker 20-, 40-, and 50-round box magazines and its 70-round drum. It has not been determined why a 36-round magazine was used. Thirty-six rounds are not divisible by the capacity of any Finnish

or Swedish pistol magazines then in use (if the German practice was followed).

- The Swedish Lahti 9mm m/40 pistol, used by both countries, had an eight-round magazine.
- The Carl Gustav was issued with high-velocity m/39b cartridges forbidden to be used in any Swedish pistols.

What were the WORST SMALL ARMS adopted by the US armed forces?*

*** A matter of opinion**

There were a number of small arms that had problems or were unpopular in someway.

One of the most notable in recent memory was the **5.56mm XM16E1** and the Air Force's **M16 rifles** when first used in Vietnam in 1965. (It had been issued to airborne, airmobile, and Special Forces units in the States in 1964.) Early test versions, including the ArmaLite AR-15 (from which the M16-series evolved) had seen limited field testing in Vietnam earlier in the war. The "black rifle" had serious jamming problems caused by a number of factors, including the design of the bolt and recoil spring and other minor design factors, but the ammunition's propellant was the major culprit. One of the main causes of jamming was poor cleaning procedures and not understanding the weapon's sensitivity and preventive maintenance needs. The same procedures soldiers and Marines had been taught for the less sensitive M14 rifle were still in use. They merely exchanged the rifles and were not taught proper preventive maintenance for the sensitive weapon nor provided with M16 compatible cleaning gear. There were also complaints of the rifles extensive use of plastics and lightweight alloys giving it a feeling of flimsiness resulting in it being called the "Mattel rifle" or "Matty Mattel gun" (a company producing plastic toy firearms).[17] This was especially evident to troopers who exchanged the heavy and rugged M14 rifle for the M16. Numerous refinements were made: redesigned bolt, bolt carrier, recoil buffer spring, and other parts; chrome-plating the chamber and bore; and an improved "birdcage" flash suppressor (the early prong-

type caught in vegetation) resulting in the M16A1. Accompanying this were a cleaner burning propellant, improved maintenance training, provision of cleaning gear, and a better small arms lubricant (LSA). It is often said that a bolt forward assist device was added to the M16A1 to ensure the bolt locked, but this had been included on the XM16E1 at the last minute before production commenced. It was not available on the Air Force's M16s. The improved M16A1 and subsequent models have evolved into fairly good weapons, although the necessity for meticulous cleaning and its penetration problems persist even with further improved ammunition; the "five-five-six" bullet is just too light no matter how its design is improved.

Complaints of M16-series rifles and the spin-off M4 carbine persist, especially in regards to its penetration, effective range, and susceptibility to dust. It is often said that the M16A1 was an improved version of the M16. The M16 was the Air Force version and lacked the forward assist device. The M16A1 is in fact a much improved version of the XM16E1.

The **.30-caliber M1 and M2 carbines** have long been popular weapons. While there are many types of carbines in the world, when one says "the carbine," most understand that it is the M1 and M2 carbines that are being referred to. First let me explain why I list the carbine as a poor weapon. I believe it is an admirable, but much overrated, weapon … *if used for other than its intended purpose.* Adopted in September 1942, it was light, compact, and looked slick. Some infantrymen acquired carbines, giving up their M1 rifles for these reasons … the wrong reasons. The reality was that the diminutive carbine cartridge had no more knockdown power or penetration through typical cover and vegetation than a light pistol round. It also lacked adequate range and killing power at even moderate ranges achieving only about half the effectiveness of the M1 rifle at 300 yards.

The round was developed from the .32 Winchester Self-Loading cartridge of 1905, which had its own shortcomings as a small game cartridge. Some have attempted to compare it to the German 7.9x33mm kurz used in assault rifles. Such comparisons are superficial. The .30 Carbine had a 110-grain round-nose, lead-core bullet with a muzzle velocity of 1,900ft/sec and a muzzle energy of 882 foot pounds. The 7.9x33mm 43m.E. (*mit Eisenkern* = with iron core) had a 125-grain spitzer bullet with a steel core delivering a 2,247ft/sec muzzle velocity and 1,408 foot pounds of muzzle energy. In Korea soldiers complained that its poor knockdown power was because of Chinese padded winter uniforms. Their winter

uniform was nothing more than about 1 inch of loose cotton insulation between two layers of cotton cloth worn over one or two uniform shirts, themselves cotton or wool. A carbine bullet would have no difficulty penetrating such clothing nor would the materials appreciably "slow" the bullet. The bullet was simply underpowered and inflicted little internal damage when it hit a person no matter what he was wearing. It could penetrate a German steel helmet only at very close range. It is so underpowered that it is illegal in some states to hunt deer with the .30 Carbine round as it often simply wounds deer allowing them to flee only to suffer and perhaps bleed to death or slowly die of infection. This impotency led to another myth. It was said the carbine was designed *not* to kill, but to only wound. The "theory" was that a wounded soldier would require at least two men to take him off the battlefield and overwhelm the enemy's medical services with wounded troops as well as affect morale. However, it is safe to say that morale is affected a lot more when troops are killed. A similar "theory" has been attributed to the M16, but both are nonsense.

There were other problems, the carbine sounded like a 6.5mm Japanese rifle causing it to sometimes attract friendly fire in the Pacific Theater during World War II. Many soldiers quickly re-exchanged their carbines for M1 rifles. In the Marines infantry leaders at company, platoon, and squad levels were assigned carbines in the table of equipment, but in many units M1 rifles or Thompson submachine guns replaced the carbines. It was reported that rear service troops in Italy, mostly armed with carbines, were frequently harassed by snipers and the short-ranged, poor-pentration carbines were ineffective for suppressive fire. The carbine experienced jamming in extreme cold weather as encountered in Germany during the winter of 1944–45 and even more so in Korea owing to weak recoil impulse and inadequate recoil springs. Some parts rusted easily. In Korea, the Marines discovered that an alcohol-based hair-tonic was an effective cold weather lubricant. During Air Force testing in the 1960s, it was found there was an average of one malfunction in every 449 rounds out of 50,707 rounds fired. The carbine, though, was a reasonable close-range personal defense weapon for radio operators, weapon crewmen, drivers, and officers at above company-level, the role for which it was intended. There were of course some combat troops who thought it was adequate for frontline use, but not many.

The 1944 *Report of the New Weapons Board* stated,

> "The opinion as to the worth of the carbine is divided. Many officers expressed a high regard for this weapon, whereas others look upon it more or less as a toy with insufficient striking power. The officers in this latter group would rather carry a rifle or a submachine gun, and a few prefer the pistol. It is believed that more information on the striking power and accuracy of this weapon should be supplied to the theaters."

A next to worthless field modification of the M2 carbine saw some use in Vietnam by reconnaissance teams and advisors. An M2 carbine had the barrel cut down almost to the forearm and the shoulder stock cut off leaving the pistol grip. There was no front sight. The "cutoff or shorty carbine" was notoriously inaccurate and created a great deal of muzzle blast, noise, and recoil. It was strictly a "pray and spray" weapon of marginal effectiveness being useful for suppressive fire under 22yd. The snub-nosed carbine was usually carried by a sling or cord around the neck with the weapon hanging at waist level. It was either a last ditch self-defense weapon or used by patrol pointmen to simply empty the 30-round magazine in one rattling full-auto burst to break contact and keep the enemy down if engaged at close range.

Another problem with the carbine was that it could be damaged by firing rifle grenades from its M8 grenade launcher and it achieved shorter ranges than the same model of grenades fired from the M1 rifle. Nor could it fire grenades using the range-extending M7 auxiliary booster cartridge as it would damage the bolt and fracture the small of the stock. The carbine originally had a very simple non-adjustable "L" rear sight. An improved sight was fitted, but not until the war's end. Carbines had to be kept very clean and there were complaints that sand and dust easily jammed it. The mistake that the carbine could serve as an effective mainline combat weapon was again made in Vietnam where the US provided selective-fire M2 carbines (which did not see combat in World War II) to Vietnamese forces as their primary shoulder weapon. They were easily handled by the small Vietnamese and other indigenous troops and the carbine's lightweight and compact size made them handy in the jungle, hills, and swamps. However, the lack of penetration through bamboo and dense brush and their poor knockdown power placed the Americans at a distinct disadvantage to

the Viet Cong and North Vietnamese armed with the 7.62mm SKS carbine and AK-47 assault rifle with considerably better penetration.

The M2 also overheated very rapidly on full-automatic and was less than accurate in that mode with a wide bullet dispersion. The Cambodian Striker unit with which the author served in Vietnam was armed with M2 carbines and found them wanting. We were grateful when issued the M16A1, regardless of its own deficiencies.

It is of course not entirely fair to rate the carbine among the worst weapons, but the author wishes to use this as an example of a weapon that, when used in an inappropriate role, becomes inadequate. It was effective as a close-range personal defense weapon, better than a pistol, but as a primary combat weapon it was an extremely poor choice. It is interesting to note that while 4,040,000 M1 rifles were produced, 6,250,000 less costly carbines were made, since there were far more support and service troops than combat troops. There were more carbines in an infantry division than M1 rifles. In fact more carbines were made in World War II than any other model of US small arm, not because it was a better weapon, but again because there were more support and service troops than there were frontline combat troops. Many types of service battalions were entirely armed with carbines and possessed not a single M1 rifle.

The **.30-caliber M1918A2 Browning automatic rifle** (BAR) is another example of a popular weapon that saw extensive use in World War II and Korea, but that experienced numerous problems. As with the carbine, some will take exception with the BAR being included among the worst weapons. It was not as rugged and reliable as desired, but it served the US reasonably well from the end of World War I into the 1970s when it was still serving in the National Guard.

However, it was heavy at 19.4lb, especially for a weapon with only a 20-round magazine. Larger capacity magazines were tested in the 1930s, but when fired from the prone position with a bipod, the muzzle could not be elevated by lowering the butt as the longer magazines did not allow the necessary ground clearance (which is why top- or side-feed magazines are desirable). The 40-round antiaircraft magazines were withdrawn in 1927 owing to jamming problems. Additionally, the magazine catch was not strong enough to retain the heavier magazines. The BAR was expensive, slow to produce, required a great deal of precise machining by skilled labor,

and demanded a lot of materials needed for other weapons. It had a large number of small intricate and fragile parts, and it was difficult and time consuming to teach troops to disassemble and reassemble it. In fact, timed disassembly and reassembly was not allowed nor were “white glove” inspections as the many small parts could be lost or damaged. The same applied to disassembly/assembly while blind-folded. It proved to be particularly difficult to keep operational in wet and muddy environments, especially in the tropics. In wet freezing weather it iced up because the oil froze. To prevent this it was not oiled, which did nothing to improve its operation in subsequent sustained firing. In milder weather the lack of oil would freeze up a BAR.

The weapon overheated easily and had no quick-change barrel capability; in fact the barrel could not be removed from the receiver in the field at all. It may have been ahead of its time at the end of World War I, but by World War II it was obsolescent. This non-changeable barrel caused another problem in that it could not be attached to a paratrooper owing to its bulk. Parachute units were not even issued the BAR forcing them to rely on heavier and less mobile tripod-mounted M1919A4 light machine guns, which had to be dropped in cargo containers with their own parachute.

Carbon fouling after prolonged firing caused malfunctions and bolt-stickage, while its weight and bulk were problems for many gunners. The gunner was provided an ammunition belt capable of holding 12 of the heavy 1.6lb (0.7kg) loaded magazines, but it was recommended that only eight be carried in the belt because of the overall weight of the gunner’s load. It was common for the 2.5lb (1.13kg) bipod to be removed. The long tubular flash suppressor was sometimes removed to reduce the length of the 4ft-long weapon by about 3in. There were rare instances where a few inches were cut off the barrel, but this caused an uncomfortably high muzzle blast and increased recoil and muzzle climb (the barrel rising as the weapons was fired owing to recoil). It also caused jamming as it affected the amount of gas delivered to the gas pistol.

Muzzle climb was a problem even with the full length barrel and flash suppressor. Some soldiers and Marines fitted homemade handgrips to the forearm in an effort to control muzzle climb. Earlier versions of the BAR were the M1918, M1918A1 introduced in 1937, and the M1922 machine rifle which saw limited use by the cavalry. The M1922 was actually a substitute for the tripod-mounted M1919A2 light machine gun at troop

level and was not a squad automatic weapon. The M1918A2, used through World War II and the Korean War, was adopted in 1940, both new production and converting the M1918A1.

As an aside, while the BAR is often thought of as an American weapon, licensed variants were produced by other countries. One of the largest users was Poland, which produced the 7.9mm wz.28 *reczny karabin maszynowy* and even used a version on bombers. Sweden used the 6.5mm m/21 (seeing some use by Finland) and m/37 *kulsprutegevär* while Belgium produced the 7.65mm Mle 30 *fusil-mitrailleur*. The Mle 30 was exported to China in 7.92mm and Chile in 7mm. Germany used some captured Polish and Belgium "BARs" (the abbreviation was not used by any of these countries). After World War II Belgium produced a refined version of the Mle 30 with a quick-change barrel, the Mle D (aka "Type D") used by Belgium in .30-06 and Egypt in 7.92mm. Externally, these weapons were different enough that they should not be mistaken for American BARs, the most noticeable distinctions being that all had pistol grips; much different butt, forearm, bipod, and cone-shaped flash suppressor designs; and, with the exception of the Swedish models, cooling fins on the barrels. No parts on these European weapons were interchangeable with US BARs. The M1918A2 was provided to Free French Forces by the US. US commercial versions with shortened barrels and cooling fins were introduced for police use in 1931, the .30-06 Colt Monitor R80*. Sales were modest, but the notorious Bonnie Parker and Clyde Barrow were ambushed and killed in 1934 by police officers using a Monitor. The two gangsters themselves were armed with M1918 BARs stolen from a National Guard armory. Foreign military export models, the M1924 and M1925 (aka R80), were available in varied calibers. The absolutely worst weapon ever adopted by the US was the French-made, bipod-mounted **Chauchat 8mm M1915 light machine gun.** The French called this incompletely developed machine rifle the *fusil-mitrailleur Mle 1915 C.S.R.G.*, which stands for Chauchat-Sutter-Ribeyrolles-Gladiator: C. = Lieutenant Colonel Louis Chauchat; S. = weapons engineer Charles Sutter; R. = Paul Ribeyrolles, manager of the G. = Gladiator Cycle Company, which made automobiles and the *fusil-mitrailleur Gladiator,* yet another common name. From 1917 it was also produced by a firm called SIDARME and their versions were said to be of slightly better quality. The Chauchat was undergoing development and testing at the beginning of World War I and was adopted as it was the only French light automatic

weapon available and could be put into production quickly. The US adopted it in 1917, but designated it with the French year of adoption, M1915. It was used by US units as a squad automatic weapon from 1917–19. US troops called it the "Sho-Sho" derived from its French name and because of the sound it made when firing … if it fired. Chauchat is pronounced "show-shah," not "chow-chant" or "show-chant" as Americans now often pronounce it. In Britain it is often called the "Chauchard."

There was a better weapon available in the form the Czechoslovak *Zbrojovka Brno* vz.26 (ZB26) and vz.30 (ZB30) light machine guns. The British Bren gun and Japanese Nambu guns were developed from these weapons. The Brno was one of the most widely used light machine guns at the beginning of World War II having been exported to 24 countries and far more widely used than BAR-type weapons. They were rugged, reliable, less costly, uncomplicated, easy to operate, had a quick-change barrel, and a top-mounted 20-round magazine (the British Bren had a 30-round). It was a couple of pounds heavier than the BAR but it could be made in any rifle caliber. The .30-caliber Johnson M1941 light machine gun ("johnny gun"), which saw limited use by the Marine Corps and the 1st Special Service Force (FSSF), was considered by many to be a better weapon than the BAR.*

* It is often stated that the FSSF traded 125 "Johnny guns" from the Marines for two tons of the then scarce RS ("Ryan's Special") plastic explosive. This was not some under-the-counter trade. It was formally approved by the War and Naval Departments and required an authorized "Special Equipment List" of non-standard items necessary for the Force.

While US divisions arriving in France after 1918 were armed with the 16lb (7.25kg) M1918 BAR, none saw action until mid-September just two months before the Armistice. Most units still made do with the Chauchat, in fact the first 23 American divisions to arrive in France were armed with it. The Chauchat was awkward to handle and highly prone to malfunction caused by sand, dust, and mud, natural elements of the trench warfare environment. The sides of the 20-round magazine were open, exposing the cartridges and follower spring to the same elements. Its tolerances were loose and the grade of metal poor. They were essentially hand-fitted and

often parts were not interchangeable between guns. It fired the French 8x50mmR Lebel cartridge meaning rifle platoons had to issue two different cartridges as riflemen were armed with .30-caliber rifles. To make matters worse, the rimmed, bell-shaped 8mm Lebel was a less than desirable cartridge for automatic weapons more prone to jamming and resulting in the drastically curved magazine. The recoil spring cylinder protruded over the butt stock from the receiver. Recoil was such that the tube could break or at least bruise the gunner's jaw, what the French called the *soufflet* (slap in the face). The Chauchat was so bad that it was often discarded and the gunners found rifles. The only good thing that can be said about it is that at 20lb (9kg) it was lighter than other squad automatic weapons of the era, such as the British Lewis Mk I (27lb) or German MG.08/15 (31lb), but the tradeoff was that those guns functioned reliably.

Some Chauchats were made in .30-06 caliber as the M1918 with a 16-round box magazine (also with open sides, but the openings were smaller). This further reduced its effectiveness by providing insufficient ammunition for one-more-short-burst-of-fire and the more powerful .30-caliber cartridge shook the weapon apart even more rapidly. It is reported that the 8mm weapons were actually a bit more reliable than the .30-caliber guns as their adaptation to .30-caliber did not take all the necessary dimensional changes and parts modifications into account. It is often assumed that the M1918 was American-made, but it too was French-produced. Few of the .30-caliber Chauchats were actually issued before the war ended. As an aside, even though the American Expeditionary Force (AEF) joined the side of the Allies and had offered aid to them throughout the war, the Chauchats and other French weapons equipping the US Army were not provided via a form of "Lend-Lease," but were purchased. The US Army completely replaced the "Sho-Sho" with the M1918 BAR by February 1919. Apparently the Chauchats were left in France and never equipped US forces in the States or elsewhere.

The French produced some 250,000 Chauchats, which they thought very highly of for some baffling reason. More were produced than any other light machine gun during World War I. By the Armistice only 63,000 were still operational in French service. The others may have found useful service as barbed-wire picket posts.

SPECIFICATION:
Lewis gun (UK)

Caliber: 0.303in
Operation: gas
Feed: 47-round pan magazine (97-round magazine in aircraft fittings)
Cyclical rate: 500rpm
Length: 49in (1,250mm)
Barrel length: 26in (661mm)
Rifling: 4 grooves, r/hand
Weight (gun): 26lb (11.8kg)
Muzzle velocity: 2,440ft/sec (744m/sec)

Belgium, Romania, Russia, Serbia, Greece, and Poland each also acquired a few thousand Chauchats. Regardless of any laurels the French laid on the Chauchat, they soon began developing a replacement, the 8mm Châtellerault FM Mle 1924 light machine gun,[18] a fairly good weapon. They updated it to 7.5mm in 1929, and used it throughout World War II, the Indochina War, and Algeria. However, it did have a problem of tearing the rim off cartridges during extraction and causing a jam. The French managed to pawn Chauchats off on the Greek, Spanish, and other armies after the war and issued stockpiled guns to their own reserve and colonial units in 1939. Belgium actually adopted it *after* World War I in 7.65mm in what might be considered an ill-advised blunder – it replaced of all things the .303 Lewis gun with which they had a great deal of success and won the grudging admiration of the Germans who reportedly called it the "Belgian rattlesnake" (*belgisch Klapperschlange*). Finland was provided with 5,000 Chauchats for the 1939–40 Winter War during which they used any weapon they could lay their hands on.

An earlier weapon with a poor reputation was the French-designed **.30-caliber M1909 Benét-Mercié automatic machine rifle** – often incorrectly called the "Benet-Mercier." This was a none too handsome Hotchkiss

design with fewer than 700 being produced in the US.[19] Used by the US Army and Marines, it was one of the replacements for the Gatling guns. It was named after Lawrence Benét and Henri Mercié, the French designers. The gun was also used by France in 8mm (Mle 1909), British and Australian cavalry in .303 (Mk I), as well as Belgium, Brazil, and Spain. The bipod-mounted, gas-operated gun weighed 27lb – not too bad for a machine gun of the era – but was considered too heavy for an "automatic rifle," which was expected to be more maneuverable than heavier machine guns. It could also be mounted on a tripod fitted with a gunner's seat. However, it fired at a slow 400 rounds per minute using 30-round horizontal feed strips.

The gun was somewhat flimsy – later Hotchkiss designs were more robust – and prone to internal parts breakage, especially the firing pin and extractor, particularly in the cold. Like the BAR that eventually replaced it, it contained a large number of small fragile parts. The manual prescribed, "The rifle should not be assembled or disassembled except under the direct supervision of an officer or a competent NCO." Its limited combat use was by the Army on the Mexican border prior to World War I and during the 1916 Punitive Expedition into Mexico. It was some use by the Marines in the early Banana Wars, but quickly replaced it with the much better Lewis gun. When General Francisco "Pancho" Villa (1878–1923) raided Columbus, New Mexico at 1am on March 9, 1916, defending US cavalrymen experienced difficulties replacing broken parts in the dark and often inserted the feed strips upside down to jam the intricate feed mechanism. Newspaper journalists referred to it as the "daylight gun" sarcastically demanding that the rules of war be rewritten prohibiting night attacks in order to allow such troops to operate their machine guns. Regardless, the two machine guns present at Columbus fired over 20,000 rounds inflicting their share of the 80 Villistas killed and 100 wounded (18 US soldiers and civilians killed).

In spite of its problems it boasted uncommon features for a machine gun of the era. It had iron sights, but the Warner & Swasey 6x M1905 telescope as used on the M1903 Springfield sniper rifle could be fitted. It also had a changeable barrel to allow for better sustained fire, a first. However, it was by no means a quick-change barrel and required the use of a wrench and adjustments had to be made once changed.

Its service ended in World War I seeing use as a training weapon until French and British machine guns were received. They were known to equip some battleship's arms lockers in late World War II. Actually, the Benét-Mercié was a marginally better weapon than the Chauchat, though more expensive and fragile.

Close runners up for the worst weapon are the **.45-caliber M50** (wooden stock) and **M55** (folding wire stock) **Reising submachine guns**[20] made by Harrington & Richardson and designed by Eugene G. Reising (1885–1967). The Marine Corps adopted these weapons in early 1942 because sufficient Thompson M1928A1 submachine guns and M1 carbines were not available. The priority for Thompson production was supplied to the British and other Commonwealth forces and then the US Army, as were carbines. Needing a compact weapon for tankers, weapons crewmen, and artillerymen in the 1st and 2nd Marine Divisions en route to the Solomons, as well as the raiders and paratroopers,[21] the Marines adopted the Reising guns. The Army had rejected it in late 1941 as it required too much cleaning to keep it operational. The Reising turned out to be very susceptible to sand, a serious flaw in light of the Marine Corps' habitual operating environment. Jamming and parts breakage were common as was a propensity for rusting. Disgruntled Marines declared the "Rusting gun" did not even make a good club.

There were complaints of its accuracy, even at close ranges. Another problem is that it was made with very close tolerances making it more susceptible to jamming by sand. The basic design itself was not too bad, but in the production rush and to keep costs down, low-grade metals were used.

Nonetheless, there were some pluses; it was 3¼lb (1½kg) lighter than a Thompson and less than quarter of the price, although this was "paid" for in other ways. By late 1943 they were withdrawn from Fleet Marine Force units (Thompsons and carbines were now available) and issued to Marine barracks naval base guards and Coast Guard beach patrols in the States, Marine ship's detachments, State Guard (militia) units, police departments, and some to the USSR as Lend-Lease. The Reising M60 was a semiautomatic only carbine (longer barrel) intended for police and used by the Coast Guard for training. There was also a carbine test version (no designation) chambered for the .30 Carbine and a .22 Long Rifle M65 semiautomatic carbine.

A pair of exceedingly poor weapons were the **7.62mm M14(M)** and **M14A1 automatic rifles**. These were intended as squad automatic weapons alongside the M14 rifle from 1957 until replaced by the M16A1 rifle in the mid-1960s. Originally the M14 rifle, itself an effective and reliable weapon, was to be accompanied by the M15 automatic rifle. This was an M14 with a heavier barrel, selector switch, bipod, and flip-up butt plate shoulder rest as the squad automatic weapon. In an effort to reduce costs it was never fielded. Originally the M14 was known as the "rifle, 7.62mm, semiautomatic, light barrel" and the M15 as the "rifle, 7.62mm, automatic/semiautomatic, heavy barrel." Instead, to fulfill the role of a squad automatic rifle the M14(M) was fielded. This was a standard M14 with the selector switch unlocked and fitted with an M2 bipod. (All production M14 rifles were fitted with a selector lock and provided the M15's shoulder rest to allow any rifle to be converted to the "automatic rifle" role.) It was known as the "rifle, 7.62mm, light barrel with bipod." There were some complaints of M14 stocks, extractors, and firing pins frequently breaking, but this proved to be no more than expected and was not that common.

While the M14 was a good rifle, actually a much upgraded M1, the M14(M) was extremely poor in the automatic rifle role owing to its very inaccurate automatic fire and overheating after rapidly firing just a few magazines. The semiautomatic M14 is a reasonably accurate rifle. The M14(M) was basically uncontrollable, spraying bullets all about, especially at over 100 meters. Additionally, its 20-round magazine limited its capability as a support weapon with its users having to constantly change magazine every four or five bursts – it could not maintain sustained fire. In an effort to improve the M14 as an automatic rifle the M14E2 was developed in 1963, issued in 1965, and redesignated the M14A1 in 1966.[22] (It had been earlier known as the M14 (USAIB) = United States Army Infantry Board.) The M14E2/M14A1 was provided with a new straight-line stock with rear pistol grip and a folding forward handgrip, rubber recoil pad, shoulder support, and a special muzzle stabilizer that slipped over the flash suppressor. These efforts to provide a more stable weapon were for naught; it was still difficult to control and still overheated. When the author undertook infantry training at Ft. Dix, NJ in late 1967 us recruits were told that only five trainees had achieved Expert qualification with the M14A1 out of the thousands of troops who had passed through the training center. It

was so noteworthy that they kept a record of this. The shooters were of course interviewed to determine the "secret" of their success, but it was found that it was the mere chance of where they sprayed bullets that earned them the Expert score rather than any special talent or technique. The M14A1 saw some use in Vietnam before it was replaced by the M16A1, which was just as well.[23] The M14A1 remained in use in the Army outside of Vietnam into the early 1970s. In my opinion, if the M15 had been fielded, even with its heavier barrel, it would not have been any better than the stopgap M14(M) and M14A1; it just would not have overheated as quickly nor would it have been any less of a bullet sprayer.

One last type and caliber of weapon must be mentioned as among the worst. The US has used a number of different models of Colt and Smith & Wesson revolvers since the 1880s, in either **.38 Long Colt** or .38 Special (from 1905 on), and into the 1990s for standard and special purpose uses. The revolvers were of excellent mechanical design, but both of these .357-caliber rounds have dismal records as man-stoppers and offered poor penetration. The .38 Long Colt could be fired in .38 Special revolvers, but was less accurate and even weaker powered. They also suffered from a problem common to most "wheel guns," they held only six rounds that had to be reloaded one-round-at-a-time, placing the revolver-armed soldier at a distinct disadvantage to someone armed with a magazine-fed semiautomatic pistol, which typically held eight rounds.

The M1A1 paratrooper's carbine is well known, but what were the M1A2 and M1A3 carbines?

The .30-caliber M1A1 carbine, standardized in May 1942, had a tubular folding steel stock that folded to the left side of the weapon. It was originally issued only to parachute engineer companies from late 1942, but was later issued to parachute infantry and field artillery units, and Marine parachute units made some use of it. M1A1 production ceased in mid-1944. An improved folding stock version, the M1A3, was standardized in late 1944 with the M1A1 becoming limited standard, on paper. The M1A3 had a pantographic folding stamped steel stock that folded beneath the weapon and offered a more rigid alternative than the M1A1's stock. The M1A1 and M1A3 were actually slightly heavier than the wooden-stocked M1 carbine

by about a quarter of a pound. Both also had a distinct pistol grip. The M1A3 was to be issued to parachute units in the Pacific, but this never went ahead as they did not enter production. They were also to be issued to the few remaining mule-borne 75mm pack howitzer battalions. At the end of the war the selective-fire M2 carbine replaced the M1, M1A1, and M1A3. As an aside, M1A1 and M1A3 receivers were all stamped only with "M1."

The M1A2 carbine was an M1 with a much improved adjustable rear sight replacing the simple L-type "flip sight," an improved "round" bolt as opposed to the original "flat" bolt, superior safety lever, plus slight stock modifications. While the M1A2 was recommended for standardization, instead, the new sight, bolt, and other features were incorporated into new production M1 and M2 carbines from 1945 with no designation change, just a change in production specifications. The M1A2 did not enter series production as such, but all its featuers were adopted.

What were the WORST SMALL ARMS used by World War II combatants?*

*** In the author's opinion**

Most of the belligerents in World War II were equipped with good to excellent small arms. It was an era in which many forms of weapons had been perfected owing to lessons learned from the Great War, experience in the conflicts of the 1920s and 1930s, and technological advances. There were weapons which became obsolete or obsolescent owing to improved enemy weapons or means to defeat or counter them, but this does not make those weapons necessarily "bad." By the "worst" weapons we mean those with design flaws that affected their functioning, performance, reliability, and/or capabilities. Not discussed here are long obsolete weapons that were still in frontline use to make up for shortages. Late-war last ditch emergency weapons and late-production standard weapons using low-grade materials and manufacturing short cuts are not discussed either. Such weapons are bad and dangerous by definition and were not generally in widespread use. While poorly designed weapons can be found in any category, it seems that many countries fielded exceedingly poor handguns with underpowered cartridges, which is difficult to understand as there were

so many good designs and effective cartridges available. Antitank rifles were another weaponry category that was pretty dismal. They were heavy, awkward, expensive, and basically obsolete by 1940. They generally remained in use for some time as they were all that were available to the infantry until lighter weight rocket-propelled and other recoilless antitank weapons began to be fielded in 1942/43.

FRANCE

French small arms of the era were generally well engineered. They may not be listed among the world's top notch weapons, but were mostly adequate.

The standard semiautomatic pistols were the **7.65mm Mle 1935A** and **Mle 1935S pistols**. They were different in external and internal design and locking methods. Many references treat these two pistols as mere variants. Virtually no parts were interchangeable between them and they were made by different manufacturers. The Mle 1935A was a Petter-Browning (Charles Petter was a Swiss arms engineer and former French Army captain) design similar to other period Colt-Browning pistols, in other words, a good, reliable, durable design. The problem was the 7.65mm Longue (Long – 7.65x17mm, aka 7.65mm MAS) cartridge, based on the World War I US .30 Pedersen.[24] Its little 85-grain bullet and light propellant load gave it asthmatic performance in regards to knockdown and penetration, barely more than a .32 ACP (Automatic Colt Pistol) using a 71-grain bullet. It was one of the most underpowered standard frontline issue handguns of World War II, although it did offer a fair range for a pistol of this caliber. Its small-caliber cartridge could have allowed a larger magazine capacity, but it held only eight rounds. Some 10,700 Mle 1935As were produced before France fell to the Germans, but over twice that number were made under the German occupation as the *Pistole 625(f)* even though of a non-standard caliber. Only 1,400 Mle 1935Ss were made before the occupation. Factory workers hid key machinery and none were made during the occupation.

GERMANY

For the most part German small arms were of excellent design, although they were often over-engineered, expensive, and demanded many high quality materials and superior workmanship. This resulted in more

simplified effective weapons as wartime production rates had to be increased, materials conserved, and unskilled workers were forced to be employed.

The **Luger 9mm P.08 pistol**, though replaced by the Walther P.38 (the only double-action pistol in widespread use in World War II), was still in wide use to the war's end being mass-produced until 1942 and remaining in limited production until the end of the conflict. The Luger was a finely engineered handgun, described as an elegant masterpiece and considered by many to be the Cadillac of pistols, or Rolls Royce depending on which side of the pond one resides. It is an aesthetically fine weapon, but was expensive and its design ill-suited for wartime mass production. While most were finely finished, many produced in World War II were not so stylish. The Luger was difficult to clean and its many small parts (63 altogether exclusive of the magazine – a contemporary Colt M1911 pistol had 41 parts) and close tolerances caused it to jam if dirty. Its upward-operating toggle action exposed the receiver's interior to dirt and sand, which led to problems in the trenches due to mud and dust. Nonetheless, it was a highly sought GI souvenir.

Germany fielded an overly complex antitank rifle just prior to the war. The **7.9mm Panzerbüchse 38 antitank rifle** (PzB.38) was an extremely expensive semiautomatic weapon. Only 1,600 were made as opposed to the single-shot 7.9mm PzB.39 of which almost 40,000 were produced. The PzB.38 was heavy, complex, and costly. Both models suffered from a tiny 7.9mm bullet (with a massive case), which did little damage when penetrating a light AFV. It would cause no significant material damage, the idea being for it to ricochet about taking out crewmen. This was the 7.9x94mmSR round (*Patrone 318*).[25] It had a somewhat heavier bullet than the standard 7.9x57mm rifle/machine gun cartridge (225 grains compared to 197 grains). One version of the 7.9x94mmSR armor-piercing tracer bullet contained a tiny tear gas pellet (*Patrone 318 SmK-Rs-Leuchtspur – Rs = Reizstoff* = irritant). It was so impotent that the pellet's inclusion was not discovered until British Intelligence dissected captured rounds. In fact, it is believed that upon striking armor the pellet often separated from the bullet and failed to enter the tank, not that a few grains of tear gas powder would cause much reaction. By 1944 these rifles were replaced by the *Panzerfaust* and *Panzerschreck.*

At the beginning of the war the Luftwaffe employed the Rheinmetall **7.9mm MG.15 aircraft machine gun**[26] in handheld mountings, mainly in bombers. This was a variation of the MG.30 ground light machine gun and was adopted in 1932, itself replaced by the MG.34. The Japanese made a copy of the MG.15, the 7.9mm Type 98 (1938) retaining the German cartridge. While of good design, the MG.15's main flaw was that it used a 75-round double-drum magazine rather than a belt. It also lacked a quick-change barrel, a moot point in most aircraft mountings. With its 1,000rpm rate of fire, necessary for aircraft defense, the "saddle drum" magazine was expended in a matter of seconds and required at least six seconds to change by a well-trained gunner in a favorable position. That was enough time for a fighter to make a devastating run at the bomber. There was also a belt-fed, fixed version for mounting in aircraft wings. It had no provision for stopping its firing in event of a runaway gun. It would fire until the ammunition was expended. Nor could it be cleared or changed remotely if jammed. These guns began to be withdrawn in 1940 and were largely replaced by belt-fed 7.9mm MG.81s, based on the MG.34, and 13x63mmB MG.131s. The MG.15 soldiered on, being modified as a bipod-mounted ground machine gun for both infantry use within Luftwaffe field divisions (where its high rate of fire was a constraint, as was its lack of a quick-change barrel) and as airfield defense guns.

GREAT BRITAIN

Most British-designed weapons were rugged and intended to last forever in the defense of the Realm but, as with other countries, there were notable exceptions.

The Commonwealth used a number of different revolvers and pistols during World War II, but the standard was the **Enfield .380/200 No. 2 Mk I revolver-pistol** (then the official British designation for a revolver). It was a modified copy of the Webley 0.38-inch Mk VI revolver, so slightly modified (though no parts were interchangeable between the two) that Webley & Scott sued the Government over design infringements and was awarded half the claimed damages. There were many suitable semiautomatic pistol designs available when the Enfield was adopted in 1932, but instead an obsolete revolver design was selected. It used an outdated break-open cylinder for loading rather than the more efficient swing-out design, plus had a stiff trigger pull. It was capable of single- and

double-action and had a hammer stop as a safety (half-cock). In 1938 the No. 2 Mk I* was adopted capable of double-action only. The Enfield had a hard trigger pull and that coupled with the double-action resulted in an inaccurate weapon. In 1942 the No. 2 Mk I** was adopted. It was still double-action only and the safety half-cock was eliminated. Instead of new marks providing improvements, they introduced additional faults. Its main flaw was its feeble .380/200 cartridge, a modified .38 Smith & Wesson (S&W) Short with a 200-grain bullet. It was extremely underpowered with limited knockdown power and poor accuracy. There were even incidents in which the bullet stuck in the muzzle, but this was due to poor ammunition production quality. The "Wobbly Webley" No. 1 Mk VI of 1915 was obsolete, though still in limited use. At least it fired the more potent .455-inch Webley and was considered comparatively reliable.

The **Sten 9mm Mk I** through **Mk VI machine carbines** were among the most recognizable weapons of World War II. These were extremely low-cost weapons – £2/10 (US$10.00 in 1941, US$156 today) – prone to jamming and if one was dropped on its butt it might fire until the magazine was empty. The low cost was one reason the Sten was developed, an alternative to the Thompson M1928A1 with a purchase cost of £56. The Sten had to be kept meticulously clean and the magazines were highly susceptible to damage to their fed lips, which were easily bent or jammed by foreign matter. The 32-round magazines (copied from the German MP.40's, but not interchangeable) were difficult to load without the issue loading tool, and cartridges could become jammed in the magazine during loading. The key to effective Sten operation was to piously care for one's magazines and ensure the gun's cleanliness. Regardless of how often it is seen in movies, it is not a good idea to grip the magazine when firing. The jolting of the recoil could cause it to jam. The sights were fixed, could not be adjusted by the user, and were often poorly factory-aligned with the bore. Soldiers found that many parts had to be filed and adjusted in order to make Stens battle-worthy.

The poorly designed Mk I Sten did not even see combat. Because of its deficiencies and its less than inspiring appearance, Stens were known as the "plumbers delight," "plumber's nightmare," "plumber's abortion," "Stench gun," and "Woolworth gun" (implying department store quality). The British Eighth Army in Italy did not use Stens, but retained American Thompson .45-caliber M1928A1 submachine guns. The Mk IIS had a very

effective integral silencer, but it was recommended to fire it only on semiautomatic as full-automatic wore the silencer out very quickly. To its benefit the Mk IIS could be easily broken down and concealed, valuable for partisans. Stens were only intended as an emergency weapon and were not expected to remain in use after the war, although they did for some years. Mk IISs saw some use by the American MACV-SOG in Vietnam.

The **Lee Enfield .303-inch No. 5 Mk I rifle** is popularly known as the "jungle carbine." The term was used by Australian and British troops at the end of World War II and during the Malayan Emergency, but was mainly made popular by a US firearms surplus importer in the 1950s. This was a modification of the standard No. 4 Mk I* rifle in an effort to provide a lighter more compact rifle for jungle warfare. The barrel was considerably shortened and had a cone-shaped flash hider added making it 5 inches (127mm) shorter than the original rifle. The forearm was cut back making it look more like a sporting rifle, cuts were made to the receiver and barrel to remove metal, the bolt knob was drilled out, and a rubber recoil pad was fitted. While the basic goal was accomplished, the weapon produced an uncomfortable muzzle blast and recoil, even with the recoil pad. The small flash hider did little to conceal the increased flash caused by the shortened barrel. The main problem was a phenomenon called "wandering zero." A rifle would be sighted in and later found to have lost its zero. Still later the sight had drifted yet again. Tests revealed that this was caused by the lightening cuts made to the receiver and the addition of the flash hider. It had lost its distinctive British character trait; robustness. The "jungle carbine" was popular to a degree only because it was lighter (reduced to 7.17lb from 8.8lb – 3.25kg from 4kg) and somewhat shorter. They were produced from 1944 to 1947. The Australians tested a similar rifle based on the No. 1 Mk III rifle as the No. 6 Mk I, but it was never adopted. In the 1950s it was not uncommon for some US firearms importers to rework No. 1 Mk III and No. 4 Mk I rifles into bogus "jungle carbines." There are probably more of these fake "jungle carbines" than there are real ones available today. All real jungle carbines were made by Royal Ordnance Factory, Fazakerly, Lancashire and marked "FY" or "ROF(F)." However, the ROF, Fazakerly also made No. 4 Mk I rifles and these may have been converted to fakes to bear the correct marking.

The **Boys 0.55-inch Mk I antitank rifle** was a much maligned weapon used until 1943. Obsolete by 1940 because of improving tank armor, the

complex and costly weapon was very unwieldy and heavy at 36lb (16kg), more than the Vickers Mk I medium machine gun (without its tripod). Regardless of the muzzle break, recoil absorber on the monopod, recoiling barrel on a slide, and a thick live rubber recoil pad, its recoil was brutal to the firer with the T-shaped monopod literally jumping off the ground. The limited issue Mk II airborne version with a shorter barrel and lighter bipod was even more brutal to fire. The Tommy called the Boys[27] "Charlie the Bastard," a name bestowed by the Australians – "the Bastard" for short. US Marine Raiders, who used small numbers of these rifles, called it the "elephant gun" because of its size. US Army Ranger battalions were also authorized Boys, but it is believed they never used them in action as the lighter and more effective bazooka was available. While the Boys began to be replaced by the somewhat bizarre PIAT Mk I antitank projector in mid-1943, it soldiered on in Commonwealth service to the end of the war in secondary roles being used against light AFVs and soft-skin vehicles. The Marines shot down a landing four-engine seaplane and a single-engine floatplane with rifle and BAR fire during the 1942 Makin Island raid. Boys AT rifle fire *may* have contributed.

ITALY

Italian weapons were generally noted for being underpowered and less than rugged. Some weapons, though, suffered serious design problems (for example see "Italian Mannlicher-Carcano rifle misconceptions" for a discussion of this less than sterling weapon).

The **Glisenti 9mm Mod. 1910 pistol** has been called the "poor man's Luger" owing to its vague external similarity to the German Luger, low quality materials, and mediocre performance. It had only a seven-round magazine. The pistol could not handle the full-power 9mm Parabellum cartridge. Its round was known as the 9mm Glisenti with a low-powered loading and identified by a truncated-cone bullet. The cartridge case was the same as the Parabellum's. The same round was used in the World War I Villar Perosa light machine gun. Higher powered 9mm rounds used in later Italian submachine guns had round-nose bullets and were headstamped "M938" (for Mod. 1938 Beretta submachine gun) so they could be differentiated from the Glisenti round. The Glisenti began to be replaced by Beretta pistols in 1915, but the Mod. 1910 remained in use through World War II as did the Berettas. However, the Berettas were only 7.65mm (.32

ACP) Mod. 1915 or 9mm Corto (.380 ACP) Mod. 1934, definately underpowered for service pistols.

The **Breda 6.5mm Mod. 1930 light machine gun** was a delayed blowback weapon firing from a closed bolt. It overheated quickly and the closed bolt operation caused it to cook-off chambered rounds during firing pauses. The delayed blowback design also made the weapon prone to ruptured cartridge cases during extraction. The barrel was quick-change and the design made this a fast process, one of its few good points. The blowback action required a recoiling barrel making the weapon more complicated and added another component to foul from dirt and sand. The gun required an integral oil reservoir to oil cartridges as they were fed. This attracted dust and sand and could jam the weapon. Its dismal performance in North Africa, Sicily, and Italy, all very dusty places, made it a less than popular squad automatic weapon. A 20-round right-side magazine was permanently fitted. To load it the hinged magazine had to be unlatched, pivoted open forward, a loaded metal or cardboard charging clip (the cardboard was a flimsy wartime conservation alternative providing its own problems) was inserted and by a forward movement of the finger the cartridges were shoved into the magazine, the charger withdrawn, and the magazine closed; a process requiring more steps than simply changing a conventional magazine. All this and the Italian 6.5x52mm round was one of the lowest powered of several different 6.5mm rounds in use in Europe.

The **Fiat-Revelli 8mm Mod. 1935 heavy machine gun** was based on the poorly designed 6.5mm Mod. 1914. Rather than being an improvement of a marginal design it was actually downgraded to a more inferior weapon. To avoid the use of an integral oil reservoir as on the original weapon, a fluted chamber was used, but it turned out that the ammunition still had to be lubricated by hand before being loaded and this only attracted more dust and sand. The fluted chamber allowed a build-up of coagulated fouling, oil, and dust. The gun was fed by a 20-round feed strip rather than a flexible belt, although the strips could be linked together. It fired from a closed bolt resulting in cook-offs and had a recoiling barrel. The operating handle was incorporated into the bolt rather than being a seperate piece. When clearing a chambered round in a hot barrel it could cook-off and the suddenly recoiling operating handle could injure the gunner’s hand resulting in it being nicknamed the “knuckle-buster” (*interruttore nocca*). At least it had a robust tripod. The 8x59mm Breda round was used only in Italian heavy

machine guns as the 6.5mm rifle and light machine gun round was insufficient for long-range machine gun fire. The 8mm was not used in any other infantry weapon thus requiring production and distribution of a special round.

JAPAN

Most Japanese weapons were considered obsolescent at best and were often underpowered and comparatively short-ranged, although the Japanese developed tactics to minimize their short-range predicament. Many of the most "modern" weapons dated from the 1930s, 1920s, or even earlier. While Major-General Nambu Kijiro (1869–1949) was called the "John Browning of Japan," his weapons were often overly complex and less than robust. This, coupled with the frequent use of low-grade metals and rushed production, made for less than effective weapons. Quality continued to deteriorate through the war. They were not overly crude though. One American soldier undertaking familiarization training on Japanese weapons commented that their workmanship and ingenuity was something to marvel at.

The absolutely worst handgun adopted by a major power, or anyone for that matter, was the **Nambu 8mm Type 94 (1934) pistol**. It was designed by Nambu Kijiro, the designer of the better known Nambu Type 14 pistol and various machine guns (see below), but it is not customarily referred to as a Nambu. It is simply a pitiable design by any standard, awkward to handle, and poorly manufactured using low-grade materials. The exposed sear on the left side could be inadvertently pressed by the thumb and cause it to accidentally discharge leading it to being called the "suicide pistol," although, if the safety was engaged this would not occur. The magazine held only six rounds and the 8x22mm Nambu cartridge was notoriously weak. This .31-caliber round had about half the muzzle energy of the 9mm Parabellum and even less than the Soviet 7.62mm Tokarev. However, it was more easily loaded than the Type 14 and had a stronger action to reduce misfires. It was mainly issued to enlisted men, but officers too received it. It is reported that a soldier pretending to surrender would insert the pistol in his harness and press it against his side to shoot an enemy when they approached close; no doubt a rare occurrence. Not only these faults but it was just plain ugly.

Most officers carried the **Nambu 8mm Taisho Type 14 (1925) pistol**,[28] which too was of poor design, offered mediocre reliability, and fired the same weak 8mm Nambu round. At least it had an eight-round magazine. Regardless of the Nambu's flaws, its cocking device influenced that on the .22 Long Rifle Ruger Standard pistol.

The Japanese adopted two marginal Nambu light machine guns in 1936 and 1939, the 6.5mm and 7.7mm respectively, but an earlier squad automatic weapon saw wide use throughout the war; the **Nambu 6.5mm Taisho Type 11 (1922) light machine gun**. This obsolete weapon, though seeing service to the war's end, had a unique feed hopper rather than a magazine. Six five-round rifle-charging clips were stacked in the feed hopper, which doubled as an oil reservoir (virtually all Japanese machine guns required oiled ammunition). This tended to collect dirt, sand, and vegetation debris causing jams. The oil had to be replenished frequently. Without oil the weapon would fail to function. Much of it would leak out if the weapon was dropped. The feed mechanism itself was overly complicated with too many small parts.

The **Nambu 6.5mm Type 96 (1936) light machine gun** also required oiled cartridges to ensure extraction. They were automatically oiled as they were loaded into the 30-round magazine by the hand-operated magazine loader. If the loader was not available the rounds had to be individually hand-oiled. Oiling was still insufficient to ensure positive extraction and an underpowered cartridge in marked cartons (red circled G) was issued for machine guns. The more powerful 6.5mm rifle cartridge could be fired in the Type 96, but it might jam or rupture the case (pull off the head) when extracted. The necessary issue of lower powered loose cartridges eliminated any true interchangeability with rifles and for all practical purposes forced an additional type of round on the unsophisticated logistics system. The Japanese were so fixated on close combat, "the way of the sword," that the 20lb (9kg) weapon mounting a top-feed magazine and bipod could be fitted with a 15.5in (397mm) long bayonet, which no doubt was an awkward handful for a soldier in a bayonet fight.

The **Nambu 7.7mm Type 99 (1939) light machine gun** was of the same design as the 6.5mm, but had a butt monopod added, was even heavier by 3lb (1.36kg) and over 5in (127mm) longer as it required a flash hider owing to its increased muzzle blast. It too was provided with a bayonet lug. These weapons were slightly modified versions of the Czechoslovak Brno ZB26,

even though some claim that they are different internally. The 6.5mm Type 96 could not be re-barreled and converted to the 7.7mm Type 99, which required new production.

Japan began switching from 6.5mm to 7.7mm in rifles and light machine guns in 1939 resulting in some divisions having a mix of weapons through the war, although battalions or regiments were usually armed with weapons of a single caliber. If this was not enough of a logistical problem, there were three different 7.7mm rounds in use. The 7.7x58mmSR was a semi-rimmed cartridge used only in the Nambu Type 92 (1932) and Type 1 (1941) heavy machine guns. The 7.7x58mm was rimless and used in rifles and light machine guns. The Imperial Navy used a 7.7x56mmR, a rimmed round that was the same as the British .303. It was used in Type 92 (1932) aircraft and antiaircraft machine guns, a copy of the Lewis gun; a completely different weapon than the Nambu Type 92 heavy machine gun. The semi-rimmed 7.7mm could not be fired in rifles and light machine guns, but rimless rounds could be fired in heavy machine guns. The semi-rimmed round had been adopted seven years before the rimless. Why the new rifles and light machine guns were not chambered for the existing semi-rimmed round remains a mystery. Reference publications sometimes list the caliber of Japanese 7.7mm weapons as .303. That may have been the actual caliber, but the 7.7x58mm ammunition was not interchangeable with the British .303in as is sometimes assumed, except for the Type 92 Lewis machine gun firing the 7.7x56mmR.

USSR

Soviet weapons varied from excellent, well-designed rugged models to extremely poor, even crude and sometimes overly complicated designs displaying poor or rushed workmanship.

The **7.62mm**[29] **Tokarev TT-30** and **TT-33 pistols** (*Tokareva-Tula* – Tokarev-Tula Arsenal) were modified Colt-Brownings, which in itself is a good design, but numerous shortcuts had been taken to lower their cost, reduce production time, and simplify the design. The two models were different internally with even more simplification incorporated into the much more widely produced TT-33 actually making the earlier TT-30 a better weapon. The angle of the grip was awkward and the overall design was not conducive to accurate shooting. There was no safety catch with “safe” being half-cocked. (Post-war exports did have a crude safety.) The

little round lacked penetration and knockdown power, one of its major drawbacks. It had an eight-round magazine.

While obsolete firearms pressed into World War II service are not discussed here, this is one exception. The **7.62mm Nagant M1895 revolver** remained in continuous production and service from 1895 to 1946. It is said to still be in use by the Russian railroad police and other police agencies. If true, it is probably the world's longest serving handgun, going on 115 years. This Belgian-designed seven-shot revolver was expensive and complex, sort of a "seven-shot six-shooter." Its 7.62x38mmR cartridge was underpowered and offered poor penetration. The revolver was made in two versions, double- and single-action, which collectors call the "Officer's" and "NCO's" (or "Private's") Models, respectively. This was not the basis of allocation. The Soviets converted most single-action versions to double-action, simply an upgrade. The .32 S&W Long and .32 H&R Magnum (Harrington & Richardson) rounds can be chambered and fired in the Nagant, but of course lack the gas-sealing capability of the unique Nagant cartridge. (See "Are silenced revolvers effective?") The Soviets also produced a pre-Great Patriotic War training model in 5.6mm (.22 Long Rifle).

The main problem with the Nagant was reloading time. After firing off the seven rounds the loading gate was flipped open, the ejection rod beneath the barrel was unscrewed to unlock it, then pulled forward and the hinged rod housing rotated to the right, aligning it with the chamber at the loading gate, the expended case was pushed through the loading gate with the rod, the rod retracted, the cylinder was hand-rotated to align the next chamber and this action was repeated six more times. The ejector rod housing was rotated back beneath the barrel, then was pushed in and screwed down, a live cartridge was chambered, the cylinder was hand-rotated to the next chamber, reloading continued one-round-at-a-time, and the loading gate was closed as you were overwhelmed by a screaming enemy horde.

Regardless of its flaws, the Nagant was popular and gained a nostalgic cult-like following. The slang term *nagan* became synonymous with "revolver." The *Revolver Systemy Nagana* saw use by Argentina (M1893), Belgium (Mle 1878, Mle 1910), France (Mle 1892), Greece (M1895), Norway (m/1893), Poland (Ng30), Sweden (m/1887), and Turkey (M1895) in various calibers (5.6mm, 7.5mm, 7.62mm, 8mm, 9.4mm, 11mm). The

Nagant even rated mention in a love poem – of sorts – by Vladimir Nabokov (1899–1977; author of *Lolita*) to his fiancée:

> I know, with certainty
> That in that lacquered purse of yours
> Nestled against powder case and mirror
> Sleeps a black stone; seven deaths.

The **7.62mm Degtyarev DP light machine gun** (*Degtyaryova Pakhotnyi* – Degtyarev Infantry) was adopted in 1928 as the squad automatic weapon. The bipod-mounted DP was provided with a 47-round pan magazine resulting in it being called the *proigryvatel* (record-player). It was considered a bit fragile and its operating spring was coiled around the under-barrel operating rod resulting in it rapidly heating up and distorting which resulted in malfunctions. The bipod was fragile and rigidly attached to the barrel making it difficult to fire on uneven ground. The DP lacked a pistol grip making it awkward to handle. The pan magazine was slow to load, which required care to prevent jamming, and was easily damaged. There were aircraft and tank-mounted versions, the DA and DT, suffering from the same problems. The DP was redesigned and the DPM (*Degtyaryova Pakhotnyi Modernizirovaiiyy* – Degtyarev Infantry modernized) was fielded in 1944. The recoil spring was relocated to a tubular housing protruding from the rear of the receiver and other improvements were made to provide a somewhat more useful weapon as was the DTM tank-mounted version.

In an effort to replace the heavy and expensive water-cooled 7.62mm PM-10 Maxim machine gun, the air-cooled **7.62mm Degtyarev DS-39 machine gun** (*Degtyaryova Stankovyj* – Degtyarev mounted) was developed employing the usual Soviet design principles … crude, yet unrefined. Maxim production was suspended in 1939 for the DS-39. While the DS-39 was lighter, simpler in some regards, and less costly than the Maxim machine gun, it demonstrated serious reliability problems caused by it rapidly fouling plus it had a complex, easily jammed feed mechanism. It had two rates of fire: low 500–600rpm and high 1,000–1,200rpm for antiaircraft. At the high rate it jammed about every 1,000 rounds and was not much better at the low rate. It was provided with a high tripod and the

unbalanced gun proved to be unstable. DS-39 manufacture was halted in mid-1941 and Maxim PM-10 production resumed as well as the introduction of a new and better designed weapon, the 7.62mm Goryunoy SG-43 machine gun.
There are other weapons that no doubt could be added to this list, but these are the main culprits of poor, faulty, or just plain dumb designs used in World War II.

What was the PEDERSEN DEVICE?

In 1914 John D. Pedersen (1881–1951) began development of a firing device that allowed the bolt-action M1903 Springfield rifle to fire semiautomatically using a smaller cartridge. Pedersen was a Danish-born Remington Arms engineer and prolific inventor designing several pistols and shotguns. He demonstrated the prototype device in 1915 and the Ordnance Department, seeing its potential, immediately declared the project Top Secret. Development continued and the device was given the cover designation of "automatic pistol, caliber .30, M1918 Mk I." One of the most unusual small arms adopted by the Army, the Pedersen device was basically a blowback pistol without the lower frame, trigger, and grip. The ammunition was designated as ".30-caliber M1918 pistol cartridges" on the cartons as part of the charade. The cartridge was a small rimless pistol-like round with an 85-grain bullet and 0.78in (17mm) long case as opposed to the .30-06 with a 150-grain bullet and 2.49in (63mm) long case. (It was adopted by the French as the 7.65mm Longue [Long] for their standard pistol and submachine gun in 1935.) The round is also informally known as the ".30-18 Pedersen." Standard Springfield rifles were modified by cutting an ejection port on the left side of the receiver and designated the M1903 Mk I. Modifications also included two grooves cut in the magazine cutoff lock and a new sear with a projection added.

To use the device the regular Springfield bolt was removed and placed in a canvas belt pouch. The Pedersen device was removed from its sheet metal belt carrier. It was inserted into the rifle in place of the bolt, locked in by the rifle's magazine cutoff, and a 40-round box magazine inserted. This protruded upward at a 45-degree angle to the right. The Pedersen device, a bandoleer of ammunition, 10 filled magazines, and four assorted carriers

and pouches added 14lb (6.35kg) to the rifleman's load, but was considered worth it for the close-range firepower. In mid-1918 the M1918 Mk II Pedersen device was adopted for use in similarly modified Enfield M1917 Mk I rifles. There were also a few test devices made for the Russian 7.62mm Mosin-Nagant M1891/10 rifle that was being produced in the US by Remington for Russia.

On the muzzle end of the device was a short barrel shaped like a .30-06 cartridge case that slid into the rifle's chamber. It was rifled with finer rifling than the weapon's bore. Because of the long barrel the .30 Pedersen bullet achieved a muzzle velocity of 1,300ft/sec, almost twice the velocity of most period handguns. It only provided a tenth of the muzzle energy of the .30-06 round, but was considered sufficiently lethal at short ranges.

The Pedersen devices remained highly classified and were to be used in the planned 1919 spring offensive. The device's tactical employment envisioned it being used in the defense to lay down a close-range rapid barrage of fire on attacking infantry. In the offense, its main role, the attackers would fire from the hip at a high rate as they advanced on an enemy position – "marching fire." They would switch to the Pedersen device within an optimistic 600yd range for mass fire (penetration through typical cover materials would have been dismal beyond 50yd). Rifle platoons would have been armed with Browning M1918 automatic rifles by this time to provide automatic weapons with high penetration and longer range. For accurate aimed fire the Pedersen-shooter had to be within 350yd, which too seems rather optimistic.

The November 1918 Armistice saw to it that the devices were never issued and they never saw combat. Production continued though, but the M1918 Mk II devices were soon cancelled when it was decided to retain the M1903 as the standard post-war service rifle and the M1917 rifles went into storage as substitute standard. M1918 Mk I device and ammunition production were finally cancelled in 1920. They were placed in storage for future use. However, all but 20 were ordered destroyed in 1929 to prevent them from falling into criminal hands during the Prohibition-era (1920–33), or so legend says. It would have been deadly with its 40-round magazine. This was probably a minimal problem because Springfield rifles needed to have the new ejection port cuts and other modifications made to internal parts in order to use the Pedersen device. Their future need was also felt unnecessary as the US actively commenced developing a full-caliber

semiautomatic service rifle in 1919, which would result in the M1 Garand rifle adopted in 1933, but not entering series production until 1939. There was also a viable tactical concern that the removal of Springfield bolts when inserting Pedersen devices in the heat of action would lead to bolts being lost and then unavailable when needed later. The M1903 Mk I rifles were converted back to their original configuration by replacing the magazine cutoff and sear with the originals, but the ejection port remained and they are considered valuable collectors' pieces today.

Whatever became of the M14 RIFLE?

The 7.62mm M14 (T44E4) rifle was standardized by the US Army and Marine Corps in 1957 and began to be issued in 1959. The companion M15 (T44E5) heavy barrel automatic rifle version was never placed in production as a cost savings measure. The M14(M) (M = Modified) rifle was issued instead as a less than effective squad automatic weapon with a selector lever and bipod. Standard M14s were issued with a selector lever lock. Other versions were the M14A1 (aka M14E2) automatic rifle, also ill-suited for the role, M21 sniper rifle, and M14 NM National Match rifle. The M14M – not to be confused with the M14(M) – was welded, preventing a selector lever from being fitted, and sold to civilians for competitive shooting. M14 production was halted in 1963. In 1965 the M16A1 rifle began to replace M14s in combat units in Vietnam. Within two years it had replaced the M14 in most support units. Combat units in Europe, at other overseas stations, and in the States began to receive M16A1s to replace their M14s in the mid-1970s and eventually M14s were entirely replaced.

SPECIFICATION:
M16

Caliber: 5.56 x 45mm
Operation: gas, rotating bolt
Cyclical rate: 800rpm
Length: 39in (990mm)

Barrel length: 20in (508mm)
Rifling: 6 grooves, r/hand
Weight (empty): 6.3lb (2.86kg)
Muzzle velocity: 3,280ft/sec (1,000m/sec)
Magazine: 30-round detachable box

Army trainees undergoing Basic Combat Training and Infantry Advanced Individual Training were still trained on M14s until receiving M16A1s in 1969. For the most part National Guard and Reserve units never received M14s, they went from M1 rifles and BARs to M16A1s. There is some evidence that a small number of high priority Guard units had M14s for a short time. M14s have remained in use in Reserve Officer Training Corps (ROTC) programs, with various drill teams, and at West Point for use by cadets (high school Junior ROTC was disarmed in the late 1970s). The Navy is replacing the M14 with the M16A3, but will retain some for line-throwing. In the 1990s over 100,000 M14s were provided to Estonia, Latvia, Lithuania, the Philippines, South Korea, Taiwan, and Turkey. Small numbers were acquired by Argentina, Haiti, and Israel while Taiwan produced it as the Type 57. Small numbers remain stored in US depots and some are loaned to police departments. A commercial version, the M1A, is available. It has been reported that M14s have been issued to units in Afghanistan and Iraq to replace M16s and M4s because of the need for increased range and penetration. However, this is not entirely true. Some M14s have been modified with telescopes as designated marksman rifles (DMR) in numerous variants and are seeing limited issue with the Marines and Army and this has led to the reports of wider use. These include the Marine Corps' DMR with new polymer adjustable butt stocks and pistol grips, detachable bipods, and silencers. The Army began issuing Navy-developed Mk 14 Mod 0 enhanced battle rifles (EBR), two per squad. This futuristic looking weapon is so redesigned that its M14 roots are barely apparent. Oddly, poor quality M14 replicas (M14 Sporter, M14S, M305) were produced and exported by Communist China in the 1980s and 1990s.

Were there Garand M1 rifles and Browning M1919A4 MACHINE GUNS CHAMBERED for the 7.62mm NATO

round?

From 1959 the US Army and Marine Corps replaced their World War II/Korean War-era .30-caliber weapons with the new 7.62mm NATO weapons, namely the M14 rifle and M60 machine gun. The Navy had only a minimal requirement for combat rifles and machine guns. Rather than purchasing new 7.62mm weapons, they made use of the large stocks of on-hand .30-caliber weapons. In order to ensure ammunition compatibility and not clutter up the supply chain with different ammunition, many of these obsolete weapons were converted to 7.62mm. The bore diameter of .30-caliber and 7.62mm weapons are virtually identical as is the head (the cartridge's base with the extractor groove). They were stocked in ships' arms lockers and issued to the crews of riverine combat craft and other small combatants such as Swift boats, armored transport craft, river patrol boats, river minesweepers, etc. in Vietnam.

The first attempt to convert the.30-caliber M1 rifle in 1964 was less than successful. An insert was "fired" into the chamber of the M1 to allow it to accept the shorter 7.62mm round. Initially designated the M1E14, the insert frequently came loose with prolonged firing and created a safety hazard and malfunctions. Modifications were made to the feed mechanism to ensure the shorter rounds chambered correctly and the rifles were adopted by the Navy in 1965 as the Mk 1 Mod 0 rifle. A further slight modification resulted in the Mk 1 Mod 1, but there were still problems. A new approach was undertaken and from 1966, when new 7.62mm chambered barrels were produced, the rifle was designated the Mk 2 Mod 0 (T35 Army developmental designation). The standard M1 rifle eight-round *en bloc* loading clip could be used with 7.62mm cartridges as the 7.62mm was simply a shortened .30-06 case. The 7.62mm ammunition was not issued clipped as had been the M1's .30-caliber ammuntion. The ammunition was issued in 20-round cartons and the clips separately resulting in the user having to "clip" the rounds. If one inadvertently loaded a clip of .30-06 ammunition into the rifle the cartridge would of course not fully chamber with the head projecting a half-inch from the chamber to hold the bolt partly open. Interestingly, there was no external identification to indicate the rifle was 7.62mm.

The 1967 conversion of the .30-caliber M1919A4 machine guns required more rework and mechanical changes. They were re-barreled with a new

7.62mm chambered barrel, fitted with a 6-in long prong-type, futuristic looking flash suppressor, the bolt and feed cover modified, and a second belt holding pawl and a feedway spacer block were added, all to accommodate the shorter cartridge and allow the use of the M13 disintegrating metallic-link belt rather than the original M1 belt links. What was now designated the Mk 21 Mod 0 machine gun used the same M13 belt links as the M60 machine gun; it was fed in from the belt's opposite end than was fed into an M60. Fortunately the 100-round belt was packed in a cardboard carton with both ends exposed so that belts could be linked together while the gun was firing and it was this free end that was fed into the Mk 21.

There were earlier trial conversions of Browning .30-caliber machine guns to 7.62mm. From 1949–56, 7.62mm cartridge (then called .30-caliber T65E3) conversions of M1919A4 (T66), M1919A6 (T66E1), and M1917A1 (T214) machine guns were tested by the Army until the M60 was adopted. (The Canadian Army fielded a similar 7.62mm NATO tripod-mounted version of the M1919A4 they designated the C1 and Israel also converted M1919A4 and M1919A6 machine guns to 7.62mm.)

Both the Mk 2 rifle and Mk 20 machine gun began to be replaced by M16A1 rifles and M60 machine guns in 1968 on riverine craft in Vietnam. No Browning automatic rifles were converted to 7.62mm. Modifications would have been extensive and there was no Navy requirement for a magazine-fed squad automatic weapon. However, a developmental 7.62mm T34 BAR was tested by the Army beginning in 1949 into the mid-1950s. As with earlier BARs, the T34 was heavy, expensive, lacked a quick-change barrel, had too small a magazine capacity for a support weapon, and contained far too many small, delicate parts.

Did the Germans PREFER the Soviet PPSh-41 submachine gun over their own MP.40 machine pistol?

It is often stated the Germans preferred the 7.62mm Shpagin PPSh-41 (*Pistolet-Pulemet Shpagina*) to their excellent 9mm MP.40. This is largely based on photographic evidence showing numerous German troops armed with captured PPSh-41s, which they designated the MP.717(r). Some PPSh-41s were converted to 9mm in 1944/45 as the MP.41(r). New 9mm barrels

and magazine adapters were supplied to German Army ordnance depots on the Eastern Front where the weapons were converted. The magazine adapter accepted 32-round MP.40 magazines. The 9mm round is about 6mm shorter overall than the Soviet 7.62mm and would have experienced impossible feed problems in PPSh-41 magazines. The MP.41(r) was mainly used by Russian- and Ukrainian-manned auxiliary security units in German employ.

The PPSh-41 was a rugged and reliable weapon, but it did have shortcomings. The 71-round drum magazine, while providing a significant amount of ammunition, was heavy, expensive, slow and difficult to load, easily damaged, made a rattling noise, and jammed easily. The heavy magazine threw the weapon off balance; one often sees the shooter bracing the magazine with his left hand with his elbow pressed into his side to support it. From 1944 a curved 35-round box magazine was issued to provide a lighter and more reliable magazine (the same magazine was used with the Sudarev PPS-43 submachine gun). The PPSh-41 required an exceedingly heavy 20–25lb (9–11kg) trigger pull.

However, the main problem was the ammunition. The little 7.62x25mm Tokarev cartridge had only an 85-grain bullet and a comparatively light propellant charge when compared to the 9mm with a 124-grain bullet. The 7.62mm was originally developed as a pistol round; it offered only short range, extremely poor knockdown power, limited ability to inflict incapacitating wounds, and equally poor penetration through typical cover materials (building walls, masonry, board fences, foxhole parapets, sandbags, packed snow, brush, etc.).

SPECIFICATION:
MP.40

Caliber: 9 x 19mm Parabellum
Cyclical rate: 500rpm
Length (stock extended): 32.8in (833mm)
Length (stock retracted): 24.8in (630mm)
Barrel length: 9.9in (251mm)
Rifling: 6 grooves, r/hand
Weight: 9lb (4.1kg)

Magazine: 32-round

The PPSh-41's nickname was the *peh-peh-shah* (pronunciation of its initials) or *balalaika* (traditional guitarlike instrument) or *finka* (nickname for a Finnish woman and what the Finns nicknamed their own 9mm Suomi m/31 submachine guns).

The PPSh-41's rate of fire was an unnecessarily high (700–900rpm) resulting in US troops calling it the "burp gun" during the Korean War, a name bestowed earlier on the MP.40 with only a more reasonable 500rpm rate.

The primary reason the PPSh-41 was used by the Germans was not because it was better than the MP.40, but simply because large numbers were captured and they were used to increase a unit's automatic firepower … they were available. MP.40s were often in short supply and any submachine gun, even with deficiencies, was useful in forest and street fighting, and on night combat patrols.

Did the German Army really use a JEWISH-DESIGNED WEAPON?

Yes, but it was post-World War II. This was the Israeli-made 9mm Uzi submachine gun, which West Germany adopted as the *MP2 Maschinenpistole.* What the Germans also called the *MP.UZI* was used mainly by tank and other AFV crews from 1959 until it began to be replaced by the H&K (*Heckler und Koch*) 4.6mm MP7 personal defense weapon in 2001. It is said that the *Bundeswehr* adoption of the Uzi was politically motivated as a form of Holocaust repatriations to the Jewish state. While there is some degree of truth to this, the Uzi was mainly selected on its merits, even though *Bundeswehr* general policy, but not a rigid guideline, was to use German-designed and made weapons. MP2s were designed and manufactured in Israel. It is an excellent submachine gun; compact, rugged, reliable, extremely easy to operate and handle, and can be fired one-handed.

SPECIFICATION:
Uzi

Caliber: 9 x 19mm Parabellum
Operation: blowback
Cyclical rate: 600rpm
Length (stock folded): 18.5in (470mm)
Length (stock extended): 25.6in (650mm)
Barrel length: 10.23in (260mm)
Rifling: 4 grooves, r/hand
Weight (empty): 8.15lb (3.7kg)
Muzzle velocity: 1,312ft/sec (400m/sec)
Magazine: 25- or 32-shot detachable box magazine

The Uzi was invented by Captain Uziel Gal (later Major, 1923–2002) of the Israeli Defense Forces.[30] It was adopted in 1951 and went on to see its first combat in 1956. Uziel Gal did not wish the weapon to be named after him, but his request was ignored. His invention resulted in him being the first person to be presented the Israeli Security Award. The Uzi is arguably one of the most recognized and popular weapons in the world. It has been used by Dutch, German, Rhodesian, South African, Portuguese, and Sri Lankan armed forces plus special operations forces, police, and antiterrorist forces the world over, including the US Secret Service. The Uzi has been largely supplanted by the German H&K 9mm MP5-series machine pistols in many countries.

Besides standard Uzis with folding metal and occasionally fixed wood stocks, other variants include the Mini Uzi, Micro Uzi, Uzi pistol, and Uzi carbine – semiautomatic with a long barrel for commercial sale. The Uzi has been produced under license in Belgium by FN, Rhodesia as the Rhuzi, Burma (Myanmar) as the BA-94, China by Norinco, and the US by Group Industries (also produced in .45 ACP and .22 Long Rifle by the latter). The Israeli Defense Forces began phasing out the Uzi in 2004 for the 5.56mm Tavor TAR-21 “bull pup” assault rifle, which is also replacing 5.56mm Galil and M16-series rifles. The Uzi remains in use by settlers and is still

exported. Imported selective-fire and semiautomatic Uzis were distributed by Action Arms in the US. Interestingly, the firm was owned by a Jew, for whom Uziel Gal worked after moving to the US. Jewish law prohibits Jews from hunting animals for sport or enabling other Jews to do so. Not wishing to break orthodox law, the firm's owner asked a rabbi for a ruling and it was determined that being a distributor absolved him from having any control over the weapons' final sale by dealers and their use by purchasers.

Did Britain officially issue Japanese rifles?

In 1914 the Royal Navy purchased some 130,000 Japanese-made Arisaka 6.5mm Taisho Type 30 (1897) carbines and Taisho Type 38 (1905) rifles. These were used for training, which is odd as they were operationally much different to Lee Enfield rifles. The Royal Navy and the Imperial Navy had close ties at the time and Japan was purchasing large quantities of weapons and materiel, even ships, from Britain. This purchase may have been in reciprocation. Also, it may have simply been because all Lee Enfield rifle production was being supplied solely to the British Army owing to the outbreak of World War I.

Some of the Type 30 carbines are believed to have been supplied to Arab nationalist forces in Saudi Arabia advised by T. E. Lawrence (1888–1935), which also used Lee Enfields and captured 7.65mm Turkish Mausers. It appears most of the remaining Japanese weapons were shipped to Russia in 1916, which was desperate for any rifles it could lay its hands on. The 6.5x50mmSR ammunition was made in Britain by Kynoch from 1917 as the .256in Mk II, probably for the Russians. The Japanese-produced rounds were designated .256in Mk I.

Interestingly the Russians were already making very limited use of a weapon in this caliber, the 6.5x50mmSR M1916 Fedorov automatic rifle or *avtomat* designed by Vladimir G. Fedorov (often misspelled as "Federov"). This less than successful selective-fire weapon is considered the world's first assault rifle – the Fedorov met the criteria for a modern assault rifle being selective-fire, short length, 25-round detachable magazine, forward pistol grip, and firing an "intermediate" cartridge of sorts. The Russians are believed to have chosen the Japanese 6.5x50mmSR as it was one of the least powerful rifle-caliber cartridges then in use. Its lighter recoil made the

rifle more controllable and placed less stress on the weak operating system. Produced in small numbers from 1916 to 1924, the Fedorov was expensive, unreliable, and prone to breakage. Regardless, some were used by the Red Army during the 1939–40 Winter War in Finland and even into World War II in small numbers.

Did the British and Commonwealth Armies use US weapons during World War II?

Yes, but not many. The Home Guard was largely armed with US-made M1917 Enfield rifles (aka P'17), M1918 Browning automatic rifles (BAR), M1917 Lewis machine guns, and M1915 Vickers machine guns, all in .30-06. They had a red band painted around the forearm/barrel jacket to identify them as .30-06 since the British already had similar weapons in .303. Thompson .45-caliber M1928A1 submachine guns were widely used by the British Army until replaced by Sten guns, but Thompsons remained in use in some units, including the Eighth Army in Italy and the Home Guard, to the war's end.

M1 and M1A1 carbines with .30-caliber were used by the airborne forces and some special operations units. Some Canadian infantry units also used M1 carbines and both the Canadians and Australians used Thompsons. The .45-caliber M1911A1 Colt pistol saw wide use and various Colt and Smith & Wesson revolvers were supplied. M3 Grant medium, M3 Stuart light, and M4 Sherman medium tanks mounted .30-caliber M1919A4 and .50-caliber M2 Browning machine guns as did other AFVs such as T17 armored cars and M2, M3, and M5 halftrack carriers. British airborne forces used the US 75mm M1A1 pack howitzer. Some 2.36-inch M1 and M1A1 bazookas were provided, but few were used. Large numbers of US-made aircraft were supplied to Commonwealth air forces and they came with US Browning .30-caliber AN-M2 and .50-caliber M2 machine guns. Browning AN-M2 aircraft machine guns were also produced in the US and the UK in .303. The US National Rifle Association collected donated rifles and shotguns and shipped them to the Home Guard, although many were useless. These donated weapons were collected and destroyed after the war, however, many of the Lend-Lease small arms, especially those used by the Home Guard, were returned after the war.

Did the US issue RUSSIAN-DESIGNED, AMERICAN-MADE RIFLES to US troops serving in Russia?

What sounds like an unlikely scenario is indeed a fact. Russia was unable to produce sufficient numbers of rifles in its own factories during World War I. In 1915 the Russian Government contracted 1,500,000 Mosin-Nagant 7.62mm M1891/10 rifles and bayonets from Remington and 1,800,000 more from Westinghouse. They also ordered 100,000,000 rounds of ammunition from Remington. Production continued into 1918. In January 1917, 356,660 rifles were delivered but no further deliveries were made owing to the arms embargo after the 1917 Bolshevik Revolution. The stocks of Westinghouse-made rifles were stamped "English Contract" and it has been suggested this was a deception effort to conceal their source, or that they were shipped via England. However, neither story is true. The production machinery at Westinghouse was owned by the British Government and Britain acted as the surety for payment for the first 1,000,000 rifles. About 2,500,000 of the rifles were actually produced. The US Army took over 208,050 rifles and when the US entered World War I they were used as training rifles as insufficient M1903 Springfields and M1917 Enfields were available to the rapidly growing Army. In July 1918 the Army designated them the "Russian Three-line Rifle, Caliber 7.62mm (.3 inch)."[31] They were not designated "M1916" as some collectors assert. After the war 30,000 of the rifles were given to the Czechoslovak Legion fighting the Bolsheviks in Russia.

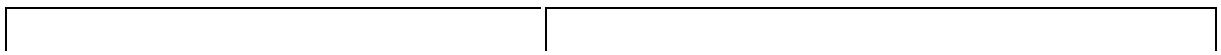
In 1918–19 the US sent the 339th Infantry Regiment to Archangel and Murmansk in northwestern Russia to protect Western citizens and interests during the Russian Civil War. Other Western Allied countries also participated in these expeditions. The American units were armed with the Russian contract rifles in order to use locally available Russian ammunition, which sometimes was not as readily available as anticipated. The rifles were left behind when the units departed in 1920. The rifles remaining in US Army stocks were sold off as surplus by 1929 with most being sporterized. The rifles aren't seen much today as the sporting conversions do not meet modern standards, in addition to their being 90-plus years old.

How can a .38 Special cartridge chamber in a .357 Magnum revolver?

This emphasizes the point that often a cartridge's designation has little to do with its actual caliber. The shorter .38 Special cartridge (introduced in 1899) chambers in .357 Magnum revolvers (introduced in 1935) because both cartridges are .357-caliber and the case design is the same with the .38 Special being 0.43in (10.9mm) shorter. The .38 Long Colt (introduced in 1875) will also chamber in .38 Special and .357 Magnum revolvers, but is seldom found in use today. When the .38 Special was introduced in 1902, actual .38-caliber revolvers, .38-40 Winchester for example, were still in wide use. It was felt that marketing the new cartridge as a ".35 Special" would do little for sales. This *nominal* caliber misleading designation .38 Special was adopted strictly as a marketing ploy. Both the .38 Special and .357 Magnum cartridges were developed by Smith & Wesson. It was common for law enforcement officers to use lower costing .38 Special rounds in their Magnum-chambered revolvers for some of their practice shooting.

This, however, was not the first revolver cartridge called a ".38" that was not in fact one. Other earlier ".38" rounds in use were actually .359-caliber such as the .38 Short Colt, .38 Long Colt, and .38 S&W. The "smaller .38" goes back even further, however. In 1851 the .36-caliber (actually .375-caliber) cap-and-ball Navy Colt revolver was introduced. Its "cartridge" consisted of a paper tube holding a lead bullet and black powder charge. Percussion caps were fitted on the cylinder's nipples over each chamber (then called "charge holes"). In 1866, these revolvers began to be converted to handle .375-caliber rimfire cartridges. To prevent confusion with the .36-caliber cap-and-ball Navy Colt, the converted revolver cartridges were designated .38 Long even though both were .375-caliber. The .38 Special was used by the US armed forces (aviators, female MPs, CID, Navy riverine craft crewmen) until the 9mm Beretta M9 pistol was adopted in 1985 and the compact 9mm SiG M11 in 1992. The .38 Special revolvers remained in US military service into the 1990s.

It is not uncommon for various shorter cartridges to be fired in revolvers designed for a longer cartridge. Examples include:



Can be fired in	**revolvers designed for**
.22 BB Cap	.22 Short, Long, and Long Rifle
.22 Short	.22 Long and Long Rifle
.32 Short Colt	.32 Long Colt
.32 Short Colt	7.5mm Nagant (Swiss)
.32 Long Colt	7.5mm Nagant (Swiss)
.32 Long Colt	.32-20 Winchester
.32 S&W	.32 S&W Long
.32 S&W Long	.32 Colt (and vice versa)
.32 S&W Long	.32 H&R Magnum
.32 S&W Long	8mm Label (French)
.32 S&W Long	8mm Rast-Gasser (Belgian)
.32 S&W Long	7.62mm Nagant (Russian)
.32 S&W Long and .32 S&W	.32-20 Winchester
7.5mm Nagant (Swiss)	.32-20 Winchester
.32 H&R Magnum	7.62mm Nagant (Russian)
.357 S&W Magnum	.357 Remington Maximum
.38 Short Colt	.38 Long Colt
.38 Short Colt	.380-inch Revolver (British)
.38 Special	.357 S&W Magnum
.41 Short Colt	.41 Long Colt
.44 S&W Russian	.44 S&W Special

.44 S&W Russian	.44 S&W Magnum
.44 S&W Special	.44 S&W Magnum
.44 S&W Magnum	.445 Super Magnum
.45 Colt[32]	.454 Casull
.45 S&W Schofield	.45 Colt
.450-inch Adams	.45-inch Webley (British)
.450-inch Adams	.455-inch Revolver (British)

Cautionary Notes:
Many of the above rounds are obsolete.
One must use caution when firing modern loadings in older revolvers. It is best to err on the side of caution and not attempt it.
Many of the above cartridges have other names and may lead to confusion. Use extreme caution and ensure the correct ammunition is being used when substituting or interchanging cartridges.
The 9mm Federal, essentially a rimmed 9mm Parabellum, can be chambered in .38 Special revolvers, but this should never be done, especially in older revolvers.
The .38 Special and .357 S&W Magnum will chamber in many .38 Long Colt revolvers, but this is dangerous and should never be done.

Is all .22-caliber rimfire ammunition INTERCHANGEABLE?

There are quite a number of .22-caliber rimfire rounds available with different case lengths, bullet weights, and propellant loadings. A wide variety of such rounds have been available over the years and can be confusing to sort out. While similar in appearance and caliber, not all are interchangeable. This also depends on the type of weapon given rounds may be used in. These rounds had their origins in the mid- and late-1800s. The shortest of these cartridges were the .22 BB Cap (bulleted breech cap) and CB Cap (conical bullet cap). Both had very short cases and were

intended for indoor range firing. The .22 Short had a longer case (11mm) while the .22 Long and .22 Long Rifle (LR) cartridge cases were the same 15mm long case. The LR simply had a longer bullet than the Long. All are .222- or .223-caliber. All of these can be fired in weapons chambered for the Long Rifle, especially single-shot and bolt-action rifles and revolvers. The shorter rounds, notably the BB and CB Caps, will not usually operate effectively in semiautomatic pistols and rifles. The .22 Short may or may not chamber reliably in LR weapons, often not. The .22 Long has just about disappeared from use.

In Europe the .22 Long Rifle is known as the 5.6mm *lang für Büchsen* (lfB) (5.6x15mmR) or Kaliber .22 lang. The .22 Short is known as the 5.6mm *kurz* or *Kaliber* .22 *kurz* (5.6x11mmR).

There was also a .22 Extra Long that has a longer case than .22 LR and cannot be chambered in weapons for that cartridge, but the .22 Short, Long, and LR can be fired in .22 Ex. Long weapons. It was introduced in the 1880s and fell from use in the 1930s as new propellants improved the .22 LR. In 1890 the .22 Winchester Rimfire (WRF) was introduced in a new rifle. The Remington version was the .22 Remington Special. It had a .224-caliber bullet and could not be chambered in other .22 rimfire weapons. The .22 Short and LR can be chambered in .22 WRF weapons and even fired safely, but they may not extract and may result in a split case. The .22 Winchester Magnum Rimfire (WMR but usually just called the .22 Magnum or the "Hunter's Pet") is a longer and more modern version of the .22 WRF. The .22 WRF can be fired in .22 WMR weapons. Two odd and little used .22 Rimfires were the .22 Winchester Automatic and .22 Remington Automatic introduced for semiautomatic rifles in 1903 and 1914, respectively. Other .22-caliber cartridges were then black powder and these rounds were smokeless. The rounds were designed so that other .22 Rimfires could *not* be chambered in weapons intended for these smokeless cartridges.

Since most of these various .22-caliber rimfire rounds are so low powered, there is little harm in firing them in most weapons chambered for other .22-caliber rimfire cartridges if they feed and chamber properly and do not interfere with the weapon's functioning. Use caution though and avoid using modern ammunition in the earlier black powder weapons. This is especially true of "hypervelocity" .22 rounds such as the Stinger, Yellow Jacket, Viper, Spitfire, Super Max, etc. (Only the first three are still in

production.) These HV rounds may have the same case length as the LR, but others have a slightly longer case with a shorter hollow-point bullet making their overall length the same as the .22 LR and able to chamber in LR weapons. With the low cost and availability of the .22 Short and LR there is no reason to try and use old, odd rounds, which often are now collector's items.

Comparative .22 Rimfire Case	Lengths (inches)
.22 BB Cap	0.284
.22 CB Cap	0.420
.22 Short	0.423
.22 Long	0.595
.22 Long Rifle	0.595
.22 Remington Automatic	0.663
.22 Winchester Automatic	0.663
.22 Stinger	0.694
.22 Extra Long	0.750
.22 Winchester Rimfire	0.960
.22 Winchester Magnum Rimfire	1.052

Are US Army general officers GIVEN special PISTOLS?

Issued, yes; given, no.
The General Officer's Pistol Program (Title 10, US Code, Section 2574) authorizes the issue of a special procurement handgun to general officers and promotable colonels (promotion to brigadier general approved, but not yet appointed) of the Active Army, Army Reserve, and Army National

Guard. However, it is not an automatic issue. They have to request it through the General Officer Management Office. The Marine Corps and Air Force have similar programs; the Navy and Coast Guard do not, they use swords.

Upon retirement generals have the option of turning in their pistols or purchasing them. They are not retained without remuneration to the government as is often reported or assumed. The request to purchase the pistol may be made within 90 days of retirement accompanied by a narrative justification indicating that the weapon is desired to be retained for sentimental reasons.

This practice began after the start of World War II. Previously general officers carried privately purchased handguns. From 1942, upon promotion to brigadier general, Army officers were issued special-procurement Colt .32 ACP Model 1903 Pocket Hammerless (eight-round) or .380 ACP Model 1908 Pocket Hammerless (seven-round) pistols. They were given a choice of caliber and their name was often engraved on the pistol. Some were issued S&W .38 Special Model 10 revolvers (six-round) with a 2in barrel. Some opted to carry privately purchased handguns and many preferred the standard .45-caliber M1911A1 Colt pistol. They might have used standard M1916/M1 or custom-made holsters, but many preferred M3/M6 shoulder holsters. Very few carried shoulder arms. Some examples are given here of different weapons carried by general officers during World War II and the Korean War:

- **Dwight D. Eisenhower** (1890–1969), Supreme Allied Commander of the Allied Expeditionary Force. “Ike” was never visibly armed, but sometimes carried a .38 Special Colt Detective Special revolver.
- **Douglas MacArthur** (1880–1964), Supreme Commander of Allied Forces in the Southwest Pacific Area. During World War II “Doug” never carried a weapon, but was escorted by a strong guard armed with Thompson submachine guns. In World War I as a brigadier general accompanying patrols he carried only a riding crop and often shunned a gas mask.
- **George S. Patton, Jr.** (1885–1945), Commanding General, II Corps and Seventh and Third Armies. He used privately purchased handguns: .45 Colt M1873 revolver (acquired 1916); .357 Magnum S&W Model 27 revolver (acquired 1935); .38 Special Colt Detective Special

revolver; .380 ACP Colt 1908 Hammerless Automatic pistol; .380 ACP Remington Model 51 pistol; and .32 ACP Colt Model 1903 pistol. "Ol' Blood and Guts" (a nickname he rejected) was often depicted wearing two handguns, but he generally wore one. Myth has it that his handguns were pearl-handled, but they had ivory grips with inlaid general's stars. In Patton's own words, "Only a pimp in a New Orleans whorehouse or a tin-horn gambler would carry a pearl-handled pistol."

- **Holland M. Smith** (1882–1967), Commanding General, V Amphibious Corps and Fleet Marine Force, Pacific. "Howling Mad Smith" carried a .45-caliber M1911A1 pistol and often a .30-caliber M1 carbine.
- **Robert L. Eichelberger** (1886–1961), Commanding General, Eighth Army. The "Prussian General" spent a great deal of time at the front making himself visible to his troops and Japanese snipers – he refused to remove his silver general's stars from his helmet. He carried a .45-caliber M1911A1 pistol alternating between a shoulder holster and a hip holster. With the latter he carried a civilian hunting knife on the pistol belt.
- **Simon B. Buckner, Jr.** (1886–1945), Commanding General, Tenth Army. He carried a .45-caliber M1911A1 pistol in a shoulder holster during his frequent visits to the frontline. Buckner was killed by Japanese artillery fire on Okinawa and it is believed he drew attention owing to the silver stars on his helmet. He was the highest ranking US officer killed in action.
- **Matthew B. Ridgway** (1895–1993), Commanding General, 82d Airborne Division, XVIII Airborne Corps, and Eighth Army. A .30-caliber Springfield M1903 rifle (World War II) and a .30-caliber Springfield M1903A3 rifle (Korean War) plus a .45-caliber M1911A1 pistol in both wars. He was reported to carry two Mk 2A1 fragmentation hand grenades on his web gear during both wars, leading to him being called "Iron Tits" or "Tin Tits," but he actually carried only one, the other "grenade" being a paratrooper's first air pouch. Some reports incorrectly mention him carrying up to five grenades. He maintained it was not for showmanship, but that grenades were practical as soldiers often had to blast their way out of situations.
- **James M. Gavin** (1907–90), Commanding General, 82nd Airborne Division. A soldier's soldier, "Jumpin' Jim" (aka "Slim Jim") carried a

rifleman's weapon, the .30-caliber Garand M1 rifle.

- **Maxwell D. Taylor** (1901–87), Commanding General, 101st Airborne Division. "Max" Taylor carried a .30-caliber M1A1 carbine and a .45-caliber M1911A1 pistol. He often drove his own ¼-ton jeep, "Ditty," and had a leather carbine scabbard mounted beside the driver's door.
- **Robert T. Fredericks** (1907–70), Commanding General, 1st Special Service Force, 1st Airborne Task Force, and 45th Infantry Division. A .45-caliber M1911A1 pistol, a V-42 "Commando" fighting knife, which he had a hand in designing, and sometimes a .30-caliber M1A1 carbine. In Italy he personally captured prisoners at pistol point.
- **William C. Chase** (1895–1986), Commanding General, 1st Cavalry Brigade, 1st Cavalry Division (Special), and 32nd Infantry Division. A .30-caliber M1 carbine and .45-caliber M1911A1 pistol in a shoulder holster. (General Chase provided the model for the fictional Sam Damon in the 1968 novel, *Once an Eagle.*)
- **William F. Dean, Sr. (**1899–1981), Commanding General, 24th Infantry Division. During the opening days of the Korean War Major General Dean was trapped behind North Korean lines and directed knocking out a Soviet-made T-34/85 tank with a 3.5in M20 bazooka and fired on North Korean soldiers with his .45-caliber M1911A1 pistol and a recovered .30-caliber Garand M1 rifle before he was captured. He personally knocked out a T-34/85 tank with a Mk 2A1 fragmentation grenade dropped in a hatch. (Accounts credit him with firing the bazooka himself and killing an enemy soldier with his pistol. Neither event occurred.)

The .45-caliber Colt M15 general officer's pistol (seven-round) was adopted in 1972 to replace all other handguns issued to generals. This was a modified Colt Commander, a slightly shorter and lighter M1911A1, aka Lightweight Commander. The Marine Corps and Air Force used Colt Pocket Hammerless and M15 pistols. The current general officer's pistol, adopted in 1984, is the 9mm Beretta M9 G.O. Model pistol (15-round). The serial numbers are preceded by "G.O." Army generals are also provided with a special black leather general officer's belt and buckle, holster, and a single-pocket magazine pouch as well as the standard olive green Kevlar® M12 holster and a cleaning kit. The Air Force refers to it as the General

Officer's 9mm Personal Defense Program. If Air Force generals retain their pistols they are refinished, replacing the Parkerizing with bluing and the black plastic grips with wooden ones.

While this topic is restricted to American generals and their arms, it might be of interest that Reichsmarschall Hermann Göring (1893–1946) surrendered to US troops in 1945 carrying a .38 Special S&W Police and Military Model 1905 revolver in a custom-made holster.

This leads us to another rumor. One often hears someone say that a relative in World War II was "allowed" to keep his weapon. This never happened. That's not to say a few didn't manage to sneak one home, which was not always a difficult feat owing to lax weapons accountability in some returning units, but it certainly was not an official policy for soldiers to be "allowed" to keep or purchase their issue weapons. If a soldier managed to sneak home a weapon the "allowed to keep" story is no doubt the one he gave to relatives. Regulations controlling the collecting of war trophies were enacted in World War II as some servicemen attempted to ship multiple weapons home. Troops on occupation duty in Japan, for example, were allowed to bring one souvenir home, either a rifle, sword, saber, or pair of binoculars. Then there's the story of a US soldier stationed in West Germany who, piecemeal, mailed the parts of an issue .45 automatic home to his wife over several months. One day at mail call he received a box containing the assembled pistol and a note from the proud wife saying she had taken all the parts to a gun shop and they put it together for him.

What new US WEAPONS might have been employed in the INVASION OF JAPAN?

There were a number of new weapons that had been adopted in 1944 and 1945 which never saw combat in World War II. Some were fielded as test weapons and had not yet been standardized. If the war had continued some would have been standardized, but with the war's end they never were. Many of these would have been available for the proposed November 1945

invasion of Kyushu, the southernmost of the Home Islands. Others would not have been available until the March 1946 invasion of Honshu, the main island where Tokyo is situated, and possible subsequent operations in mid-1946. Of course the use of the atomic bombs precluded the predicted slaughter that both sides would have suffered.

The following weapons may not have initially equipped all units, but would probably have equipped the initial assault divisions as well as divisions committed to later landings and also to replace combat losses. Some of these weapons were replacements for existing weapons and others were new, requiring a new place within units, and new tactics. A few of these weapons were combat-tested on Luzon and Okinawa in 1945. Many of these weapons were used in Korea and some subsequent conflicts, but others were never fielded.

Weapon	**Comments**
.30-cal M2 carbine	Selective fire version of M1 carbine.
.30-cal M1A3 carbine	Improved folding stock version replacing M1A1 carbine.
.30-cal T3 carbine	Fitted with active infrared night vision scope.
.30-cal T22E2 rifle	Selective-fire M1 rifle. Perhaps redesignated M2 rifle.
.30-cal T26 “tanker’s carbine”	Shortened version of M1 rifle.
.45-cal M3A1 submachine gun	Improved version of M3 “grease gun.”
2.36-in M18 rocket launcher	Lightened version of M9A1 bazooka.
3.5-in M20/M20B1 rocket launchers	Replacement for M9A1/M18 bazookas.
60mm T18E6 mortar	Improved version of 60mm M2 mortar.

105mm T13E6 mortar	May have supplemented 81mm M1 mortar.
57mm T15E9 recoilless rifle	New assault weapon system.
75mm T21 recoilless rifle	Replacement for 37mm M3A1 antitank gun.
4.2-in M4 direct-fire mortar	New anti-bunker weapon system.
M39 (T41) armored utility vehicle	New armored support vehicle.
M24 Chaffee light tank	75mm-gun armed replacement for M5A1 light tank.
M26 Pershing tank	90mm-gun armed partial replacement for M4A3 Sherman.
40mm M19 twin SP AA gun	Partial replacement for 40mm M1 towed AA gun.
105mm M37 SP howitzer	Partial replacement for 105mm M7 SP howitzer.
155mm M40 SP howitzer	Partial replacement for 155mm M1A1 towed howitzer.
155mm M30 SP gun	Partial replacement for 155mm M1 towed gun.
8-in M43 SP gun	Replacement for 8-inch M1 towed gun.
240mm T92 SP howitzer	Replacement for 240mm M1 towed howitzer.

Is it true the .45-caliber handgun cartridge was adopted by the US Army because of the inability of the .38-caliber to stop

fanatical Moro guerrillas … and just what was a Moro anyway?

During the 1899–1903 Philippine Insurrection, the US Army used Colt .38-caliber M1892, M1894, and M1896 revolvers while the Marines had the Colt M1895. These revolvers were seldom able to effectively stop a charging Moro warrior.[33] The .38 Long Colt round, dating from 1875, had less power and accuracy than today's .38 Special, which itself has long been found inadequate as a man-stopper by law enforcement officers. Moros would achieve a mental state called *juramentado* (derived from the Spanish word *juramentar*, the term described "one who has sworn an oath"), worked up to fanaticism via a religious ritual accentuated by narcotics, an act prohibited by the Koran (*Qur'ān*). Before going into battle they would tightly bind their limbs and genitals with leather straps to staunch blood flow from bullet and blade wounds. Armed with *krises* (daggers), *barongs* (machetes), *kampilans* (two-handed swords), *sibat*s (spears), and muskets they set out to kill infidels (non-believers of Islam).

They were extremely difficult to stop even with multiple .38-caliber revolver and .30-caliber Krag rifle bullets. The full-jacketed Krag bullet often went right through the charging fanatic, a clean wound, and coupled with the "pre-applied leather tourniquets" and their incensed state, they just kept on coming. However, 12-gauge riot shotguns with buckshot proved effective at close ranges. However, calls for a return to the .45-caliber had been raised before encountering Moros as some had long recognized the inadequacies of the .38 Long Colt. "And beneath the starry flag, civilize 'em with a Krag, and return us to our beloved home."[34]

The admittedly unscientific Thompson-LaGarde Cadaver Tests of 1901 found that at least a .45-caliber handgun cartridge was necessary as a man-stopper.[35] Obsolescent Colt .45-caliber M1878 revolvers (Colt Double Action Frontier Model) were brought out of retirement and proved to be a more effective man-stopper, but they were not reissued until 1902. The earlier .45-caliber Colt M1873 revolver (Colt Single Action Model – Peacemaker) was also reissued after updating. Between 1895 and 1903 thousands of these obsolete handguns were refurbished and modified by cutting the 7½in barrels down to 5½in.[36] They were issued during the Spanish-American War and Philippine Insurrection. The improved .45-

caliber Colt M1909 revolver was issued in 1910, but it never approached replacing all .38-caliber and reissued .45 Colt revolvers as it was mainly used in the Philippines. The US Army and Philippine Constabulary were still fighting Moros as late as 1913, the year the .45-caliber Colt M1911 automatic pistol began to be issued, but it saw little action against the Moros as is often assumed.

Some claim the .45 Colt was little more effective than the .38 Long Colt, but that is much debatable. The .38 Long Colt with a 150-grain bullet had a muzzle velocity of 770ft/sec and a muzzle energy of 195ft/lb while the .45 Colt with a 185-grain bullet developed a muzzle velocity of 1,100ft/sec and a muzzle energy of 497ft/lb.

Why were US AVIATORS often issued REVOLVERS instead of automatic pistols?

Prior to the issue of 9mm M9 pistols in the late 1980s US aviators were often issued various models of Colt and Smith & Wesson .38 Special revolvers instead of bulky .45-caliber M1911A1 pistols, the standard handgun (although M1911A1s were also issued to many airmen in World War II and later).

During World War II studies showed that aviators often lost the use of an arm or hand through injury while jumping from an aircraft by parachute (either during the exit or upon landing) or during a crash landing, or had suffered an arm/hand injury from enemy fire prior to bailing out or crashing. Such an injury may have prevented them from cocking an automatic pistol, which requires a hard pull on the slide with one hand working the slide and the other holding the pistol hands. (It can awkwardly be cocked with one good hand by clamping the pistol between the knees, but this is not too practical.) However, a revolver can be reloaded and thumb-cocked more easily with one useable hand. Revolvers were also of lighter weight and more compact (2- or 4in barrel typically) than the M1911A1. Today, aviators of most US services are issued 9mm SIG M11 compact pistols regardless of one-handed cocking difficulties. Army aviation uses the 9mm Beretta M9. The US Air Force presently wishes to replace the M9 and M11 with a new .45-caliber, high-capacity magazine semiautomatic pistol, which will eventually be carried by all services'

aviators. The Army has taken over control of the program, however. The Army is also considering a "subcompact" personal defense weapon (PDW) for aircrew and others requiring something more substantial than a handgun, but not so bulky as a carbine such as the 5.56mm M4.

Were Argentine "Colt" pistols made from the steel of the *Graf Spee?*

The *Admiral Graf Spee* was a German "pocket battleship," what they simply called an armored ship (*Panzerschiffe*) – heavily armed, lightly armored, long-range commerce-raiding cruiser.[37] (They were reclassified as heavy cruisers in February 1940.) She conducted merchant ship raids in the South Atlantic, however, when damaged by a Royal Navy cruiser, the *Spee* undertook partial repairs in Montevideo, Uruguay. The ship was scuttled in the mouth of the Plate River on December 17, 1939 rather than hopelessly fight three waiting Commonwealth cruisers and suffer great loss of life. When sunk the *Graf Spee* rested in shallow water with decks awash, but over the years it has settled into the deep estuary silt and today only the top of the mast is visible, creating a navigation hazard.

Seemingly unrelated to this event, from 1938–53 an unlicensed copy of the Colt .45-caliber M1911A1 pistol was manufactured by *Hispano Argentino Fabrica de Automoviles, SA* (HAFDASA) and known as the *Ballester-Molina 11.43mm Modelo 1938 pistola* (not to be confused with the similar HAFDASA-produced Colt Modelo 1927, which was licensed). There are some internal differences between the M1911A1 and the Ballester-Molina. They were produced in large numbers through World War II and used by the Argentine Army and police. Some were still in use at the time of Argentina's 1982 Falkland Islands invasion. Interestingly, 8,000 to 10,000 of the pistols were purchased by the British Special Operations Executives (SOE) during World War II, identifiable by a "B" (for British) prefixing the serial number.

It is claimed that the World War II production Modelo 1938 pistols were made of steel salvaged from the *Graf Spee.* Argentina and Uruguay both border the Plate River estuary, but the *Graf Spee* rests in Uruguayan territorial waters. **The claim that the pistols were made from** *Graf Spee* **steel is not true,** it is simply an imaginative marketing ploy advertised in

1980s gun magazines when the pistols began to be sold as surplus in the US, a lame effort to make the pistols more historically appealing. Many of the pistols were fabricated from US-made steel provided to Britain via US Lend-Lease and then transferred to Argentina. It was not just the SOE-purchased pistols, but other Ballester-Molinas from 1941 as the supply of the steel was in payment for the pistols and Argentina was experiencing a serious shortage of weapons grade steel to manufacture its own weapons.

Serious salvage of the *Graf Spee* did not begin until 2004 and it was planned to eventually raise the ship and display it in Uruguay. Some artifacts had been removed earlier. There is no evidence of any prior removal of internal or turret armor plate for use in firearms. Regular ship structural steel would be inadequate for firearms manufacture and it is not certain that armor plate would be acceptable either. After some components and structures were removed, salvage efforts were suspended by the Uruguayan Government in 2009 owing to German protests regarding the commercial exploitation of Nazi-era relics. In 1940 Germany sold its rights to the ship to a Uruguayan civilian, who was actually working on behalf of the British. A Royal Navy boarding party subsequently removed some technical items including the radar. Since 1973, Uruguay has laid claim to any and all wrecks in its territorial waters. It is reported that the continued salvage and eventual rising of the *Graf Spee* resumed in April 2012.

Were “TUNNEL RATS” in Vietnam issued special handguns?

Volunteer infantryman and combat engineers would explore Viet Cong tunnel systems to map them; recover enemy weapons, equipment, supplies and documents; and emplace explosive charges to collapse the tunnels or spread tear gas (CS) powder. It was an extremely dangerous, dirty, and physically and psychologically demanding job. The tunnel rats’ unofficial motto was *Non Gratum Anus Rodentum!* – “Not Worth a Rat’s Ass!” The often extensive tunnel systems were usually still occupied by the enemy, although they would normally withdraw deeper into the complex rather than risk close-range firefights in the darkness. There was still a high chance of encountering the enemy in the close, dark confines or discovering diabolical booby traps the hard way.

Tunnel rats were armed with various handguns. The most common was the standard issue **Colt .45-caliber M1911A1 pistol**. Needless to say, firing a .45 automatic inside a tight-fitting tunnel was deafeningly painful and caused permanent hearing damage. It literally feels like nails are driven into one's ears. They were used only as a last resort. Hearing protection could be worn, but it was essential for tunnel rats to be able to hear the slightest sounds of movement in the pitch black tunnels.

High Standard **.22 Long Rifle Model HD** semiautomatic pistols (ten-round), sometimes with non-removable silencers (Model HDM), were occasionally provided (originally acquired by the OSS, the Office of Strategic Services, in 1943). The silencer had a life of about 200 rounds, which was not a serious drawback as they were so seldom fired. The **Ruger Mk I Target** semiautomatic pistol (10-round) also saw some use.

In 1966 the Army issued six experimental tunnel exploration kits. With the kits came an S&W .38 Special revolver with a silencer and aiming light; the specific model is unknown, possibly the Model 10. The aiming light was unnecessary and the silencer too long making the revolver unbalanced. Silencers do not really work on revolvers, but they did greatly reduce the sharp report and ear damage. In 1969, 75 **Quiet Special Purpose Revolvers (QSPR)**, also known as "tunnel revolvers or tunnel guns," were issued. These modified S&W Model 29 revolvers fired special .40-caliber shot cartridges designed to make a report no louder than a .22-Long Rifle. The shot cartridges held 15x7.5-grain tungsten steel pellets in a plastic sabot and used the gas seal piston concept to reduce its noise signature. It had no sights and had a 1.375in (35mm) smoothbore barrel. They were inexplicably withdrawn after six months use, probably because they performed poorly owing to the unusual cartridge system. Even its reduced report was too loud in a tunnel's confines. Limited use was also made of 12-gauge pump shotguns, but even with sawed-off barrels and stocks they were too cumbersome, to say nothing of the deafening blast and muzzle flash.

From where did the idea of the 40mm GRENADE LAUNCHER come?... And how was it developed?

In World War II the Germans issued a series of HE projectile-firing weapons based on a modified 27mm flare pistol, the combat pistol

(*Kampfpistole*), issued in 1941, and the assault pistol 1942 (*Sturmpistole 42*); the latter had a folding shoulder stock. Besides HE grenade cartridges, both fired various special purpose rounds to include target marking, smoke, and signal flares. The small caliber though greatly limited their lethality, and accuracy at longer ranges was wanting. An experimental weapon was discovered by the US Ordnance Department after the war using the same 27mm grenade cartridges, but it was a bolt-action, breech-loading weapon using a rifle shoulder stock.

In World War II the Italians fielded a similar grenade launcher called the Mod. 28 *tromboncino launcia bombe* (grenade launcher discharger). This consisted of a short 38mm caliber barrel, bolt-action receiver, and trigger release. The muzzle-loaded discharger was mounted on the right side of the Mannlicher-Carcano 6.5mm Mod. 91/28 TS carbine. It used a 6.5mm ball cartridge to propel the grenade. The carbine's bolt was removed and inserted into the discharger when grenades were to be fired. This was a "bullet trap" type of launcher and the bullet did not travel downrange. It used a 6.5mm ball cartridge to propel the grenade. It was fairly heavy and being mounted on the carbine's side unbalanced the weapon. Additionally, the little grenade was none too lethal. It was replaced by the Brixia 45mm Mod. 35 assault mortar (*mortáio da 45/5 d'assalto modello 35*).

Between 1950–53 the Ordnance Department developed a 40mm HE grenade cartridge. The break-open, breech-loading, shoulder-fired **M79 (XM79) grenade launcher** was adopted in 1960 after being developed from 1952 under Project *Niblick* – nickname for a No. 9 iron, a high-lofting golf club. One can easily follow the round downrange, which looks just like a golf ball in flight. It was developed at Springfield Armory as the S-5. The M79 began to be fielded in 1961 and intended to replace rifle grenade launchers firing casualty-producing grenades and pyrotechnic signals. Since an effective antitank round was not possible for the M79, the M72 LAW rocket launcher was developed to replace antitank rifle grenades and 3.5in M20-series bazooka rocket launchers issued to support units for antitank defense. One complaint of the M79 was the loss of two rifles from the Army's rifle squad as grenadiers carried only a pistol for personal defense. (Originally the squad leader was to be armed with an M79.) The pistols contributed nothing to the squad's effective firepower. In many units the .45s were not issued as they were too often lost. Some grenadiers did carry a rifle though. Because of dense vegetation in some areas, which limited the

use of the M79, only one was carried per squad in some units so that more rifles could be available. The Marines initially added a single grenadier to their 13-man squad, but later the squad's three fire team leaders carried an M79 thus losing three rifles, until the M203 was fielded.

Experimental repeating 40mm grenade launchers similar in general appearance to the M79 saw limited field testing in Vietnam. One model, the Springfield Armory T148E1 had a side-fed three-round clip and another was a pump-action model with a four-round under-the-barrel tubular magazine developed by China Lake Naval Weapons Center (no assigned designation). These proved to be of too flimsy construction, too awkward to handle, and were prone to jamming because of mud, sand, and vegetation debris. A field modified M79 was used by MACV-SOG and other reconnaissance units as a "break-contact" weapon, that is, a weapon that gives a small team facing a superior enemy force additional firepower allowing it to disengage. The shortened or cut-down M79 had approximately 3in cut off the muzzle along with the front sight, the large rear sight was removed, and the butt stock cut off leaving a pistol grip. It was carried either on a cord around the neck or in a canvas holster.

In an effort to increase the rifle squad's firepower, plus provide grenadiers with a point fire capability, a means of mounting a 40mm grenade launcher under the M16 rifle was sought. The first result was the **XM148** (aka CGL4 – Colt Grenade Launcher) developed by Colt in 1965. Issued for limited combat testing in Vietnam in 1967, it was plagued with mechanical and safety problems, the most annoying being that the barrel sometimes followed the projectile downrange. Additionally, the sight was defective, the trigger mechanism overly complex and easily broken, and excessive force was necessary to cock it. The design of the **XM203** Grenade Launcher Attachment Development (GLAD) began in 1967 by AAI Corporation and after field testing in Vietnam in 1968 was standardized in August 1969. Colt did not begin series production until 1971 and it saw only limited use in Vietnam before the last combat unit was withdrawn in August 1972. The M79, informally nicknamed the "blooper," "thumper," "thump gun," and "bloop tube" (the Australians called it the "wombat gun,"[38] "shottie," or "sawnoff") remained in use into the mid-1970s in the US armed forces and is still encountered in developing countries. "GLAD" designation never caught on as a nickname. The **M203** could be mounted on the M16A1, M16A2, M16A3, and M16A4 rifles,

XM177E2 submachine gun, and M4 and M4A1 carbines with a special front adapter. It was adapted to be mounted on different weapons with the fielding of the **M203PI** (the product was modified for mounting on other rifles such as the FN FAL, H&K G3, Steyr AUG, etc. and was not used by the US military), **M203A1** for mounting on the M4 carbine, and **M203A2** (mounted on the M16A4 MWS rifle). A modifed M203 with a 9in barrel rather than the 12in is available in the SOPMOD (Special Operations Peculiar Modification) kit for the M4A1 carbine used by special operations forces. (This is sometimes incorrectly reported as an "M203A1.") There are also shoulder stock/pistol grip adapters available on which an M203 can be fitted as a standalone weapon like the M79 for special purposes. The M203-series, what the British call an Underslung Grenade Launcher (UGL), will be with us for some time.

In Vietnam the Australians called the XM148 and XM203 "under and over guns." The M203 will eventually be replaced by the 40mm **M320** Grenade Launcher Module (GLM), adopted in 2008 and issued in mid-2009 and based on the German H&K AG36. The M320 was originally intended to be mounted on the 5.56mm XM8 carbine, the M16-series rifle's planned replacement, but the XM8 was cancelled in 2005 owing to reluctance to acquire a new family of weapons in the midst of two wars. Additionally, the XM8 was deemed not all that much better than the M16. The M320 mount can be modified to fit on whatever weapon is finally selected to replace the M16/M4 as well as on those weapons. It can be dismounted and used as a standalone weapon with a shoulder stock adapter. It mounts a laser rangefinder and infrared laser pointer providing for a more accurate and faster-firing weapon. It was developed from the H&K AG-C Enhanced Grenade Launching Module (EGLM). The 25x40mm **XM25** Counter Defilade Target Engagement System – it's still a grenade launcher – began fielding in Afghanistan in November 2010 with wider fielding in 2012. It provides a laser-ranged high-explosive airburst (HEAB) "smart" round designed to airburst over the target if behind a barrier such as a wall or berm or in an open-topped fighting position, ditch, or gully. This is a standalone shoulder-fired weapon with a four-round magazine that is not mounted on a rifle. The XM29 Objective Individual Combat Weapon (OICW) attempted to incorporate a 20x23mm "smart" airbursting grenade launcher with a new 5.56mm rifle.[39] Plagued with many problems, the most notable being too small a bursting charge and insufficient fragmentation, it

was cancelled also owing to the weapon's excessive cost and weight. The XM25 is basically the improved 25mm grenade launcher component from the XM29 redesigned as a standalone weapon. In 2007 the US Navy approved the FN 40mm **Mk 13 Mod 0** Enhanced Grenade Launcher Module (EGLM) for limited procurement and mounted on the FN 5.56mm Mk 16 and 7.62mm Mk 17 SOF combat assault rifles (SCAR).

As an aside, the 40mm round used in these grenade launchers is the low-pressure, low-velocity NATO standard 40x46mm. The high-pressure, "high-velocity" 40x53mm is used in belt-fed ground/vehicle-mounted grenade machine guns and formerly used in helicopter-mounted automatic grenade launchers. The rounds are *not* interchangeable between either type of weapon. South Africa developed the 40x51mm Extended Range Low Pressure (ERLP) round, which can be fired in 40x46mm grenade launchers and vice versa. Romania uses a 40x47mm round in its under-barrel grenade launchers and it and the 40x46mm are interchangeable.

Did the US Marines use a SHOULDER-FIRED mortar?

In 1943 the Marines were searching for an effective weapon to knock out Japanese pillboxes. The early actions on Guadalcanal, Bougainville, and elsewhere had found Marines in dire need of a bunker- and cave-busting weapon. They did not receive the bazooka until late 1943, first using it on Tarawa in November. Not yet familiar with the coming bazooka's capabilities, in the meantime they called for a pillbox-buster. In response the Army developed the 60mm T20 mortar, or "Garrett mortar." It consisted of a modified conventional 60mm M2 mortar barrel inserted in a sleeve containing a massive recoil spring. It was mounted on a light bipod and fitted with a trigger mechanism, pistol grip, simple direct-fire sight, and a shoulder piece with a thick rubber recoil pad. It was tested in the US in comparison with the 2.36in M1A1 bazooka at the same time as the Tarawa assault. The T20 was assessed to be superior to the bazooka between 100 and 200yd ranges but tests showed that the bazooka could be made a more effective all-purpose weapon by developing a high-explosive-fragmentation warhead. (This was done later and fielded on a limited basis, but was used only by the Army. This round, consisting of two modified Mk II fragmentation hand grenades, was intended for antipersonnel use and was

not effective against bunkers unless fired through a firing port.) Subsequently 100 T20s were issued to the 1st Marine Division for combat testing during the September 1944 Peleliu assault with one given to each rifle platoon and the others held as spares. By this time the Marines had almost a year's experience with the bazooka, which had proved to be reasonably effective against pillboxes and caves as they refined assault tactics and engagement techniques. In comparison, the T20 proved to be extremely unpopular and most were discarded within a few days after D-Day on Peleliu. It was heavy, over three times as weighty as the new 13lb (5.9kg), 2.36in M9 bazooka. The mortar projectile though was about 1½lb (0.68kg) lighter than the bazooka rockets. The T20 could only be fired from the bipod while the shoulder-fired bazooka was more easily positioned to engage difficult to reach targets on the islands' incredibly rugged and broken terrain.

Being muzzle-loaded, the T20 could not be fired downhill, a serious deficiency on the hilly island where enemy positions often had to be engaged from higher ground. The main problem though was the T20's cruel recoil, even though it was propelled only by the ignition cartridge with the propellant bags removed from between the fins. Recoil was so severe that a Marine could fire only one or two rounds before having to be relieved.

Did the US Army adopt a DIRECT-FIRE RECOILLESS MORTAR?

In 1943 the requirement was stated for a large-caliber mortar that could be fired horizontally directly into Japanese pillboxes, which diverges from the definition of a mortar – a high-angle indirect-fire weapon. Bunker roofs were often too thick for conventional mortars to penetrate and it took a great many rounds to score a direct hit; mortars are not precision point target weapons. The rounds were heavy and required much manpower and effort to man-pack sufficient numbers over rough terrain to achieve only a limited effect. Also, there were few clearings in jungles to allow indirect-fire mortars to even fire, and then the rounds would often airburst in the treetops over the target, which had no effect on pillboxes. The first attempt involved using a 4.2in M1A1 mortar barrel with a special base plate that could be chained to a stout tree trunk. It was okay if sufficiently large trees

were present and in the right place with a clear line of fire, but nature was not always cooperative in the tactical sense. Additionally, it could not be depressed below 0 degrees to fire downhill. A new “mortar” was designed with both ends of the barrel open. This resulted in an entirely different kind of propellant charge for the much modified 4.2in (107mm) round and created what was in effect a short-barreled recoilless rifle. The 4.2in M4 recoilless mortar was tested in August 1944 and proved effective against log and earth bunkers at up to 900yd (820m) ranges blasting them apart. Even though it was not a HEAT (high-explosive antitank) round, testing proved its sheer force and impact defeated the comparatively light frontal armor of Japanese tanks. It was muzzle-loaded like a mortar, but had an open base (“breech”) end to allow the back blast to escape. Being fired horizontally and possessing an open breech for blast escape meant in reality it was not a mortar, only being made from a former mortar barrel and muzzle-loaded. The heavy barrel was mounted on an M1917A1 machine gun tripod. One thousand were produced and 100 were combat-tested on Okinawa in the spring of 1945. It was withdrawn from use after the war’s end, and it is worth noting that they probably would have been used in the proposed invasion of Japan. The 57mm M18 and 75mm M20 recoilless rifles had, in the meantime, been fielded and were more accurate, more mobile, longer ranged, and lighter. The jeep-mounted 105mm T19 recoilless rifle (to become the M27) was also under development along with a 105mm T9 recoilless howitzer (never adopted). The 4.2in M4 recoilless mortar though had a much more powerful bursting charge than these weapons and would have been a more effective bunker-burster, but it never saw use after Okinawa.

Did the US Army adopt an AUTOMATIC-FIRING BAZOOKA?

In the late 1940s and early 1950s the US Army developed the **3.5in M25 (T115E1) repeating rocket launcher** and standardized it in 1951. It used the detachable forward barrel section of the M20 bazooka coupled to a complex rear barrel section with the bulky firing and feed mechanisms all mounted on an M77 tripod. It also used the bazooka’s optical sight. The feed hopper held three rockets. While it is thought to have been

standardized and possibly combat-tested in Korea (unconfirmed) and 1,100 were built between 1951 and 1953, the weapon appears never to have been fielded. The M25 was never listed in any unit table of organization and equipment. Perhaps it was to replace the 49lb (22kg), 57mm M18 recoiless rifle (plus 52lb [23.6kg] tripod) in the rifle company's assault section. The 57mm recoilless rifle was heavier than the M25, but it was more accurate and reliable, and offered much longer ranges when used as a support weapon, although it provided limited effectiveness as an antitank weapon. Additionally, the 57mm could be fired from a tripod, on the ground from its bipod, and from the shoulder.

The M25's design was somewhat impractical with it providing no real advantage over other weapons already in use. It offered no more range over the 3.5in M20-series bazookas as the barrel was only 8in (20.3cm) longer than M20's. Its heavy weight – 60lb (20kg) launcher, 40lb (18kg) tripod – and its bulkiness negated the ability of a bazooka-armed soldier to stalk a targeted tank, quickly move into a favorable firing position, and rapidly relocate once he had revealed his position by firing. The 3.5in M25 repeating rocket launcher was simply a weapon for which there was no need, an example of a concept that was not first run past the users to see if it was even wanted.

Did the US Navy adopt DIRECT-FIRE MORTARS?

The 81mm Mk 1 Mod 0 direct-fire mortar was developed by the Navy's Bureau of Ordnance at Naval Weapons Station, Crane, Indiana at the end of World War II for mounting on patrol torpedo boats (PT). They were intended for use against Japanese supply barges. These were never deployed, except on some post-war experimental PT boats, and after failing testing the project was shelved in 1952. In the early 1960s there was a need to provide offshore patrol boats with a comparatively lightweight direct and high-angle fire weapon capable of engaging watercraft and targets ashore. The weapon was upgraded as the 81mm Mk 2 Mod 0 and issued with no clear concept of employment nor was sufficient data apparently even collected on which to evaluate its effectiveness.

The Coast Guard adopted the 81mm in 1962, first testing it at sea aboard a seaplane tender. They were first mounted on large cutters serving as

weather ships in the Atlantic and Pacific, which doubled as station vessels. As such, one of their missions was to fire illumination flares to aid commercial and military aircraft forced to ditch at sea. The 81mm was tested in the Caribbean and found to be much more effective in this role than the 3in gun firing star shells. The 81mm flares provided better illumination, had less bore fouling problems, and could be fired at a higher rate. The Coast Guard was also experiencing difficulties with worn out Oerlikon 20mm Mk 4 automatic cannons mounted on cutters. In mid-1964 a Coast Guard warrant officer suggested that a .50-caliber M2 machine gun could be "piggyback" mounted on the mortar. The prototype was built at the Coast Guard Yard, Curtis Bay, Maryland. This "two-in-one gun" provided a more flexible "over-and-under" mounting with two dissimilar weapons requiring only one weapon station and one crew. This was a major benefit owing to the space, weight, and manning limitations on small craft. It was discovered that the heavy mortar and its robust mount provided a very stable mounting for the machine gun allowing a high degree of control. A .50-caliber machine gun on a standard flexible mount is difficult to control because of the weapon's heavy recoil. The piggyback system was mounted on a flatbed truck and test fired at Dahlgren Proving Grounds, Virginia in late 1964. Two were then mounted aboard a Coast Guard cutter at Norfolk, Virginia for successful test firing at sea. With the machine gun piggybacked it was designated the Mk 2 Mod 1.

The naval direct-fire mortar was of an entirely different design than any mortar previously in US service. It was designed to be mounted on naval small craft to provide both direct and indirect (high-angle) fire. The mortar consisted of a smoothbore 81mm barrel and a recoil slide fitted on a carriage. Locking levers were provided on the carriage to lock the mortar at a specified elevation and deflection, but it was commonly used as a free swinging (traverse and elevation) weapon. The barrel was fitted with a breech mechanism with the trigger firing mechanism on the left side of the recoil protective basket. A selector knob was provided to change from drop fire to trigger fire. An artillery-like recoil cylinder was fitted on top of the barrel. A basket arrangement was fitted on the breech end to protect the gunner from the recoiling barrel.

This entire assembly was mounted on a Mk 1 Mod 0 fixed tripod fitted to a heavily reinforced ring base fixed to the boat's deck. It was muzzle-loaded and fired either by drop-fire or the trigger system, the latter being the

preferred method. A Browning .50-caliber M2 heavy barrel machine gun was mounted atop the mortar to allow an alternate means of direct-fire target engagement. It was not intended for direct-fire ranging for the mortar by observing the tracer stream and bullet impacts as is sometimes reported. The two weapons' trajectories were much different. Its normal butterfly trigger and twin spade grips fired the machine gun. The mortar and machine gun could not be fired simultaneously.

The mortar was operated by elevating the barrel to between 30 and 35 degrees, the round muzzle-loaded, and then trigger-fired. It was not to be loaded for trigger firing when elevated higher than 35 degrees, but could be drop-fired from 35 to 71.5 degrees elevation. Mechanical time-fused rounds were not authorized to be drop-fired. It could fire HE, WP, and illumination rounds, the same ammunition as used in the normal M29 mortar, along with Navy-developed flechette and chaff rounds.

One mortar was mounted on various US Navy and Coast Guard coastal patrol, attack, and riverine craft used in Vietnam from 1965–70 with most eventually turned over to the Vietnamese Navy. These included inshore patrol craft (PCF; aka "Swift boat"), river monitors (MON), assault support patrol boats (ASPB), Nasty- and Osprey-class fast patrol torpedo boats (PTF), Point-class all-weather patrol boats (WPB; Coast Guard cutter), and Asheville-class patrol gunboats (PG). It was also mounted on Australian 140ft Fremantle-class patrol boats in the 1980s and 1990s.

HE (high-explosive) rounds were used for direct and high-angle fire against enemy watercraft and shore targets. WP (white phosphorus) could be used for the same purpose or to lay smoke screens either to blind the enemy or screen friendly movements. WP rounds impacting on the surface of the water created a smoke screen between the boat and the enemy craft or the shore. "Illum" rounds, what the Navy calls "star shells," were ideal for providing illumination to identify suspect watercraft at night and light up shore targets. The Navy introduced the Mk 120 Mod 0 flechette round in 1969 for short-range direct-fire antipersonnel use and for striping camouflaging vegetation for riverside fortifications. For targets such as bunkers located on the water's edge the HE round could be skip-fired across the water to ricochet into the target, like skipping a stone. In theory at least, the direct-fire mortar could engage helicopters and other low-performance aircraft at close ranges (approximately 1,100yd) by firing HE rounds with variable time (VT) fuses to achieve airbursts. It is doubtful that this was

ever tested much less actually attempted. The Navy also developed chaff rounds to distract anti-ship missiles.

All of the craft on which these mortars were mounted were equipped with ranging radar and this aided greatly in determining the range to the target. Occasionally a craft would secure itself to a fixed object or even temporarily run aground in order to provide a more stable platform when engaging long-range targets. At sea or even on rivers, a moving and rolling boat, coupled with sea-swell, currents, and winds, provided a less than stable firing platform greatly reducing the mortar's accuracy.

The Navy also made limited use of a similar 60mm Mk 4 Mod 0 direct-fire mortar mounting them on some river patrol boats (PBR) from 1969. These small boats were incapable of mounting the 81mm. A 7.62mm M60 machine gun could be piggyback mounted on the 60mm (with no designation change). A small number were reported on patrol boats (PB) in the Persian Gulf during the 1990–91 Gulf War.

What was the LOBBER MISSILE?

In the 1950s the US armed forces were infatuated by missile technology and were considering any and all uses for the new technology. Some were not planned as weapons. One of these was developed by the Convair Division of General Dynamics for the Army Quartermaster Corps, the Lobber. It was also tested by the Marine Corps. Rather than a weapon, the Lobber was originally envisioned as a resupply missile, mainly for ammunition and medical supplies. The launcher looked like a massive mortar on a lightweight base plate and bipod. The missile was 10in (250mm) in diameter and 9ft (2.7m) long, the nose protruding from the launcher tube. The missile was transported in three sections: shock-absorbing nose cone containing a parachute, the cargo container capable of lofting 50lb (23kg), and the solid-fuel rocket motor with a folding fin assembly. The system was operated by a three-man crew which could assemble and launch the missile within minutes to an 8-mile (13km) range. Development began in 1955 and its first test firing was at the end of 1958. The system was intended to deliver supplies to friendly forces cut off by the enemy. There were a number of instances during World War II and the Korean War when such a capability would have been valuable. On occasion

155mm smoke projectiles were emptied of their smoke charges and critical supplies were fired to cut off troops, with a high degree of danger to the downrange recipients. Another problem was that these emergency "resupply projectiles" often buried themselves deeply in the ground making it difficult or impossible to find and recover them. The Lobber proved to be ineffective as its range could not be accurately adjusted being a solid-fuel rocket, especially if the cutoff troops were confined in a relatively small area and the parachute's drift could cause it to miss the target area. Even though the Lobber could carry more supplies than a conventional artillery projectile, it was not cost effective as it would take a great many missiles to deliver a meaningful amount of supplies; a 100-round can of .50-caliber ammunition weighs 35lb (16kg), for example. The missiles themselves required considerable shipping space. In order to salvage the project, Convair suggested that high-explosive, chemical, nuclear, and napalm warheads could be provided. Again, accuracy was a problem as was its short range and the project was scrubbed.

Prompted by the Lobber, the Postmaster General of the US declared that America was on the threshold of delivering mail via red, white, and blue-painted rockets before man traveled to the moon (that occurred in 1969). "Your mail will be delivered within hours from New York to California to England to India or Australia by guided missiles. This would be the greatest peaceful use of missile development." Congress never granted funding owing to the high cost, danger, and impracticality of having not always so reliable missiles streaking all over the world.

What was the VIPER rocket launcher?

Most infantrymen know of the Viper as a Multiple Integrated Laser Engagement System (MILES) antiarmor rocket simulator used to replicate the M136 (AT4) LAW (Light Antiarmor Weapon) in force-on-force training exercises and sometimes used to inadequately replicate the RPG-7 by the OPFOR (Opposing Forces – the maneuver enemy).

Development of a replacement for the M72A3 LAW, initially known as the Improved Light Antitank Weapon (ILAW – "eye-law"), began in 1975 by General Dynamics. The project was renamed the XFGR-17A Viper in 1976. The 70mm Viper, approved for further development in 1980, was

redesignated the XM132 in 1981. It was supposed to use state of the art technology, be manufactured in metric specifications for NATO standardization, and possess a much longer range and lethality than the M72A3 enabling it to frontally kill Soviet T-64 and T-72 tanks, the era's principal threat tanks. Since US factories did not have equipment for metric manufacturing, special machinery had to be developed resulting in high cost overruns. It was developed with the same effort as designing a strategic bomber resulting in the waste of a great deal of money. The Viper's performance fell below the desired capabilities and more money was spent in futile efforts to fix it. It is simply impossible to produce a lightweight, disposable antiarmor weapon with the necessary penetration for frontal kills or one accurate enough to allow it to be a throwaway weapon with a cheap simple sight. Another problem was that an additive, carborane, was mixed with the propellant. This increased the propellant's force (velocity), but it amplified the decibel level to make it unacceptably high and it generated more smoke in the firing signature. The project was wisely terminated in 1983, after wasting eight years in development and a lot of money. In its place the off-the-shelf Swedish AT4 was standardized as the M136 LAW.[40] The MILES Viper was developed in anticipation of the XM132's standardization. It was retained rather than develop an M72 or M136 MILES device.

Note: Within the US military the term "antiarmor" replaced "antitank" in the early 1970s.

Was there really an Italian HAND-CRANKED MORTAR that flung DISK-SHAPED PROJECTILES like Frisbees?

There was indeed. This was the *lanciabombe minucciani* hand-cranked mortar appearing late in World War I. It was actually a grenade thrower designed to project a modified disk-shaped 510g (1.2lb) Mod. 1914 hand grenade up to 200 meters. Mounted on a timber frame platform the *minucciani* operated similar to an automatic baseball or tennis ball throwing machine using a hand-crank and gears, sprockets, and flywheels. The grenades, with the arming pin removed, were fed into a side-loading port, the hand-crank turned to build up the launching spring's tension, the spring

retaining pin withdrawn, and the grenades launched out of a curved tube as more were rapidly hand-fed into the loading port. The grenades were activated by a fiction igniter when launched and would detonate with a 15-meter casualty radius after an eight-second delay. The *minucciani* were set up in trenches and a crew could launch up to 30 grenades a minute up to 200yd. A barrage of these grenades sailing into the right place like clay pigeons could break up an infantry attack, but timing was everything. If fired too close in front of the advancing enemy they might rush past the falling grenades before they detonated. Fired too far in front of them the troops could hit the dirt before they detonated.

What were the first dedicated ANTITANK WEAPONS?

The very first purpose-built antitank (AT) weapons originated in World War I.[41] In early 1918, the Germans fielded a massive 16kg (35.27lb), 1.68m (66.14in) long single-shot, bolt-action, bipod-mounted Mauser antitank rifle. It was called the *Tank Abwehr Gewehr Mod. 18* (tank defense rifle or *T.Gew.* – "T-rifle") and fired the 13.2x92mmSR (.525-caliber; often simply called "13mm").[42] The German *Landser* called it the *Elefant-Büchse* (elephant gun) for obvious reasons. The Germans also converted an obsolete 37mm five-barrel revolver cannon (*Gruson-Hotchkiss 3.7cm C/73/88 Revolverkanone)* into the first rudimentary antitank gun – think a hand-cranked 37mm Gatling gun. Their standard 77mm field cannon (*7.7cm Feldkanone 1916* – "Whizz-bang") proved to be an acceptable antitank weapon, even without an AP (armor-piercing) round (early tanks had very thin armor). (It should be noted that World War I and II artillery pieces were usually inadequate as AT weapons owing to their limited field of fire and slow traverse. They are also too large and heavy to easily conceal and relocate to an alternate position, essential to ensure survival.)

The Germans also fielded a small number of expedient antitank guns in the form of the Rheinmetall 3.7cm Tak (*Tankabwehrkanone*) in early 1918. The British issued the first antitank rifle grenade in 1918, the No. 44 Mk 1. It relied on a common explosive charge to burst the light armor found on early German tanks and had no shaped-charge or other specially designed warhead. The first dedicated antitank hand grenade was issued by the French, the *grenade à main antichars Mle 1918*. It was a stick grenade with

a large rectangular tin containing 900g (1.98lb) of picric acid (a now obsolete explosive) intended to be thrown from a short range into a tank's treads or on top of the tank. The Germans issued machine gun crews a belt of armor-piercing ammunition and riflemen carried a five-round clip of AP rounds (*K-Patrone – K = Kern* [core] meaning a steel-cored bullet). In 1915, 7.9mm rifle/machine gun-caliber AP rounds had been developed to penetrate steel shields used by snipers and were subsequently used against tanks. German riflemen also found that by carefully removing the lead-cored bullet from a 7.9mm ball cartridge and reinserting it backwards into the cartridge case it could penetrate the light armor of British tanks and sniper shields at close ranges. Care had to be taken when chambering the rounds in bolt-action rifles to prevent a misfeed and they could not be used in automatic weapons. The reason this worked is that the heavier blunt base of the reversed bullet would not break off or deform as the pointed end would and it could punch through thin armor. The British did the same with the .303in rifle round for anti-sniper use. This should *never* be attempted with modern ammunition.

How good was the GERMAN 88mm GUN and was it the standard artillery piece?

We always hear about the much vaulted German "88," the *acht-acht* or *Otto-Otto* to the Germans.[43] How hot was it? In World War II the Germans employed four different models of 88mm antiaircraft guns, what they called the 8.8cm Flak.18, 36, 37, and 41. A variation was also used on Mk VI Tiger tanks and various heavy tank destroyers plus there were large towed antitank guns, the 8.8cm Pak. 43 and Pak.43/41, both nicknamed the *Scheünentor* (Barn Door) because of its massive size and large gun shield. The 88mm flak guns were frequently used as antitank guns and were quite effective due to their accuracy, long range, high velocity, and ability to penetrate the armor of any Allied tank, even at their maximum combat range. Their most effective range was between 600 and 2,000 meters. One soldier referred to it as the "anti-everything" gun. Bill Maudlin in one of his famous Willie and Joe cartoons depicted an enraged Willie questioning an intelligence officer who was replying, "I'll let you know when we capture the inventor of the 88." They were first actually used as antitank weapons

during the Spanish Civil War and not in North Africa as is often assumed. It did have significant limitations as an antitank gun, however, it had a very high profile and was difficult to conceal. Its large size and high profile made it very time consuming to dig in, tough to conceal, and it was difficult and demanded too much time to relocate to another position if under fire, essential for an antitank gun if it is to survive.

Like the US 90mm antiaircraft gun, 8.8cm Flak was used on occasion in the indirect-fire role to supplement field artillery, but this was undertaken much less by the Germans than the Americans. While an excellent heavy antiaircraft gun, the 8.8cm actually made a very poor artillery piece being a long-barreled gun rather than a howitzer and possessing such high velocity that it limited fine elevation adjustments when adjusting fire on point targets, especially if firing on targets behind hills and ridges. The Germans also failed to effectively create fire direction centers to employ the “88” as indirect artillery. It was only 3.46in caliber, but did have a comparatively large high-explosive capacity. The Flak.18 (adopted 1934), 36, and 37 were not designed as dual-purpose guns (antiaircraft and antitank), but were used as such out of necessity. The Flak.41 integrated many features to make it a better dual-purpose gun, but many of these features were underdeveloped because of rushed testing and the design fell short of expectations. A few were sent to North Africa before the Axis surrendered there. Field use only highlighted its flaws. Fewer than 300 Flak.41s were built and their use was mainly confined to the Reich for air defense. In this role their dual-purpose capabilities were for naught.

In contrast, when compared to the US 90mm M1 and British 3.7in (93.4mm) Mk III AA (antiaircraft) guns, the ”88” was not quite as effective. The 88mm threw a 20.3lb (9.2kg) projectile to 26,000ft with a 2,600ft/sec muzzle velocity. The US 90mm had a 23lb (10.4kg) projectile with a 2,700ft/sec muzzle velocity reaching to 32,000ft. The UK 3.7in had a 2,600ft/sec muzzle velocity throwing a 28lb (12.7kg) projectile to the same altitude. The 8.8mm was somewhat lighter than these guns making it slightly more useful as an antitank piece, but not by much.

Contrary to what one sees in war movies, memoirs, novels, and even official publications about being under “88mm fire,” the “88” was *not* a German field artillery piece. Not to belittle World War II veterans, but to many, all German artillery was called “88s” and all German tanks were “Tigers.” The “88” was not the standard German field artillery piece. In

fact, the “88” was not even organic to a normal German division. Most were manned by the Luftwaffe and intended for Fatherland and army-level air defense, though there were some Army-manned 8.8cm Flak units protecting rear area facilities and even Navy-manned guns defending seaports.

The standard German divisional field artillery consisted of three battalions of 12 each 10.5cm le.FH.18 light field howitzers backed by a battalion of 12 15cm s.FH.18 heavy field howitzers and four 10cm (actually 105mm) s.K.18 heavy guns for counterbattery. German infantry division artillery was all horse-drawn. It was extremely rare indeed that Allied troops were fired on by “eighty-eights” in an indirect-fire artillery role.

Some of the credit given to the “eighty-eights” as a deadly long-range tank-killer in North Africa actually goes to the superficially similar Italian *cannone da 90/53 41C.* This 90mm 53-caliber (barrel length) antiaircraft gun was one of the better Italian weapons and while some claim it compared to the 88mm, it was not quite that good. It saw some use in the antitank role as well as being used as a static coast defense gun (41P) and a truck-mounted AA gun (*autocannoni*). It was occasionally employed for indirect artillery fire. It was not widely available as barely over 500 were produced between 1941 and 1943 and most were employed in Italy in the static role.

Early in World War II there was an unfounded fear within Allied air forces in the Pacific that the Japanese 7.5cm Type 88 (1928) antiaircraft gun was a variation of the much more effective German 8.8cm Flak, a rumor based solely on its “88” designation, which was the Japanese year (2588 = Western year 1928). The Type 88 was actually based on an unremarkable 1920s British 3in Vickers design and was an obsolete and less than effective weapon long predating the 8.8cm Flak. Japan did field a limited number of 8.8cm Type 99 (1939) antiaircraft guns copied from the 1930 German War Navy 8.8cm/45 SK C/30, a much different and less effective design than the normal German “88.” Some of these former German guns, adapted for land use, were captured by the Japanese during the battle of Nanking in December 1937 (China used large numbers of German-made weapons). The Japanese reverse engineered the gun and produced it until the 1940 Tripartite Pact precluded copying Axis weapons without license. The Type 99 guns served only in the Home Islands and were employed against the *b-san* (Mister “B”) as they called the B-29 Superfortresses.

The German Navy had used 8.8cm dual-purpose and later aintiaircraft guns aboard everything from U-boats to battleships since the 1890s. Even the World War II variants were much different weapons than the 8.8cm Flak used ashore.

From where does the nickname “BAZOOKA” come?

In 1941, the US Army developed a large shaped-charge antitank rifle grenade, the M10. The problem was that it was too heavy to fire from a rifle without damaging it and the firer. It could not even be fired from a “rifle” grenade launcher on a .50-caliber machine gun. That same year the Army purchased a number of British 2in antiaircraft rockets to test under its fledgling rocket development program. In early 1942, new rocket motors, much different from the British rockets, were fabricated and the M10 warhead fitted to them. A 60mm steel tube was fitted with two handgrips, a shoulder stock, rudimentary sight, and a simple electrical firing system. The result was the 2.36in T1 antitank rocket launcher. After firing the weapon, the Chief of the Ordnance Department’s Technical Staff, Brigadier General Gladeon M. Barnes, noted the weapon’s similarity to a farcical music instrument called the “bazooka” used by radio comedian and musician Bob Burns, the “Arkansas Traveler” (1890–1956). He invented the trombone-like instrument in 1905 making it from two telescoping lengths of gas pipe and a whiskey funnel, and copyrighted it in 1920 (a smaller version was called the “kazooed bazooka”).[44] The bazooka nickname was applied and stuck to what became the M1 rocket launcher. GI’s frequently referred to it as a “zooka” and in the early days it was occasionally called the “shoulder 75,” aluding to it having the power of a 75mm howitzer. While under development the bazooka was codenamed “The Whip.” The bazooka was also called the “stovepipe” for obvious reasons and this nickname was used by the Germans for their similar, but larger, 8.8cm R.Pz.B.43 rocket launcher, the *Ofenrohr* (stovepipe), the concept of which they copied from the 2.36in bazooka. Its official designation was *Rakete Panzerbüchse* (rocket armor-gun – *Büchse* is an old term for a rifle or gun) and it bore another nickname of *Panzerschreck* (armor terror – what it was hoped to inflict). The Germans designated captured US M1 bazookas the *Rakenten Panzerbüchse 788(a).* In some intelligence reports the Germans referred to

it as the *Stanley Panzerbüchse.* The origin or meaning of *"Stanley"* is unknown.

FACT:
It is sometimes said that the concept of the German 8.8cm *Panzerschreck* came from 2.36in bazookas captured from US troops in North Africa in late 1942. This is not true. The idea came from US bazookas captured from the Soviets in late 1942. The US provided the USSR with 8,500 M1 bazookas through Lend-Lease in September that year.

The concept of the US post-World War II 3.5in (89mm) M20-series "super bazooka" came from this German weapon (however, the 3.5in itself was not a copy of the German weapon; the US was already working on a 3.25in bazooka and increased it to 3.5in for a more efficient and lethal HEAT round.). The term "super bazooka" soon fell from use once the 3.5in replaced the 2.36in to just become another "bazooka," or simply the "three-point-five." "Bazooka" is sometimes used loosely, and often incorrectly, to describe any form of small shoulder-fired rocket launcher or even recoilless rifle, especially by the lay-media, which cannot seem to differentiate between rocket launchers and recoilless rifles, or between tanks and self-propelled artillery, or destroyers and battleships for that matter. Just as a rifle is never called a "gun," recruits quickly learned that the "bazooka" was *never* called as such, but was called a "rocket launcher."

In an effort to counter the shaped-charge effect delivered by the bazooka and similar weapons the Germans attached thin sheet steel or wire mesh panels to the sides of many tanks and assault guns. This protected the hull sides and upper suspension system. It was sometimes installed around the sides and rear of tank turrets. The 0.15–0.2inch (4–6mm) thick steel skirting began being installed on new production tanks and assault guns in March 1943. The wire mesh skirting was introduced on Mk IV tanks in September 1944. It has been reported that the sheet metal panels were installed solely to help protect from Soviet antitank rifles. It appears to have caused the 14.5mm bullets to fragment or "keyhole" (turn sideways) and fail to penetrate the main armor. They were, however, also intended to protect against shaped-charge projectiles. The wire mesh skirting (*Drahtgeflecht Schürzen*) offered no protection from antitank rifle bullets. The Germans referred to these as *Schürzen* (skirting) and the American soldiers called them "bazooka pants."

There is one other "weapon" bearing a name borrowed from the bazooka. What are variously known as potato guns, potato cannons, and spud guns – homemade guns firing potatoes and made from PVC pipe – are also known as spudzookas. There is even a small "marshmallowzooka" that fires marshmallows.

Bazooka Bubblegum was introduced in 1947 in a patriotic red, white, and blue wrapper. The Topps Company today claims that the name was taken from the old musical instrument and not the weapon, but by 1947 the

weapon was much better known than the nearly forgotten instrument. The Bazooka Joe cartoon character was introduced by the bubblegum company in 1953 and was included in the gum packaging as small cartoon strips. The gum is still marketed and the cartoon characters have recently been updated, and have absolutely nothing to do with bazookas.

Were the first US RECOILLESS RIFLES mounted on AIRCRAFT?

As peculiar as it sounds, **the first recoilless rifles were aircraft armament**. In 1910/11 Commander Cleland Davis of the US Navy developed a "non-recoiling gun" in an effort to provide aircraft with a weapon capable of firing high-explosive projectiles at surface targets. The St Petersburg Declaration of 1868 – later updated by the Hague Conventions 1899 and 1907[45] – prohibited high-explosive projectiles weighing less than 1lb from intentionally being fired at personnel, as a humanitarian measure. The intent was to prevent rifle-caliber high-explosive bullets from being fired at individuals. The Navy developed a 37mm round and the new fangled flying machines could not deal with the firing stresses of any weapon larger than rifle-caliber. This prevented the era's crude aircraft from mounting a weapon that could fire high-explosive projectiles.

The Davis non-recoiling gun was comprised of essentially two opposing long-barreled guns fitted back-to-back – breech-to-breech so to speak. The forward gun's bore was rifled and operated on the counter-mass principle. The forward gun was fixed to a mount in the nose cockpit of Curtiss NC-series flying boats and aimed downward at a forward angle for engaging surfaced or submerging submarines. The equally long, smoothbore rear barrel had a pivot allowing it to be rotated out of alignment from the forward gun. The cartridge was loaded in the breech of the forward barrel, the rear barrel pivoted into place and locked. When the gun was fired a load of lead buckshot packed in grease, loaded in the rear portion of the cartridge case and weighing the same as the projectile, was blown upward out the rear barrel to negate the recoil. It was a good idea for accompanying aircraft to avoid flying above the firing aircraft. A Lewis .30-caliber machine gun was mounted atop the forward barrel for spotting. The guns were the 47mm

Mk 11, 65mm Mk 12, and 75mm Mk 13 firing 6, 8, and 9lb (2.7, 3.6, and 4.1kg) projectiles respectively. The guns were very effective and the British and French obtained some with the British planning on using them as anti-zeppelin guns aboard Handley Page bombers, attacking the airships from above (this was never done). The US Army Air Service did not even test the Davis guns. They fell from use in the late-1920s and it would be about 15 years before the US again examined recoilless rifles, this time using a different recoilless principle.

What were the largest and smallest RECOILLESS RIFLES?

There have been some rather large-caliber recoilless guns tested. One of the largest experimental weapons was the German *Rheinemetall Gerät 104* (Device 104), a 35cm (actually 355mm – 14in) caliber, 11.2m (37ft) long barrel slung under a twin-engine Dornier Do 217 heavy bomber. It fired a 1,500lb (680kg) counter-recoiling, armor-piercing projectile. The projectile was a modified naval gun shell and the weapon was intended for attacking capital ships with the bomber in low-level flight. Irrespective of installing blast deflectors and armor on the lower fuselage, the massive muzzle and back blasts made the project impractical. An even larger weapon, the *Münchhausen,* was at least proposed, although a single prototype may have been built, but probably never flew. This was a 54cm (21.2in) recoilless gun to be mounted under a Junkers Ju 87 *Stuka* dive-bomber.

The largest: During World War II the British tested the 7.2in (182mm) Burney P1 recoilless gun designed to blast down fortifications with a "wallbuster" shell developed by Sir Charles Burney (1888–1968; he also developed the paravane, a ship-towed device for cutting submarine mine cables). Intended to defeat German Atlantic Wall (*Atlantikwall*) fortifications, it was never used, but was developed into a 4.7in (120mm) antitank weapon after the war. It evolved into the **120mm BAT** (Battalion Anti-Tank) recoilless rifles (RCL), a series of progressively lighter weapons seeing post-war active service.[46] The 120mm L1/L2 BAT was mounted on a 6-pdr (57mm) antitank gun carriage with a large shield. It was introduced in 1952 and was not much more mobile than the 17-pdr (76.2mm) Mk 1 antitank gun it replaced. The 120mm L4 Mobat (Mobile Battalion Anti-

Tank)[47] was introduced in about 1958. It was a modified BAT eliminating the shield, provided with a much lighter two-wheel carriage, and could be mounted on a jeep or Land Rover. It was still quite heavy at 1,700lb (771kg). For ranging a modified (butt and bipod removed) .303in Bren Mk 2 light machine gun firing tracers semiautomatically was mounted on the barrel's left side. Later this was replaced by the 7.62mm L4 version of the Bren. The L7 Conbat (Converted Battalion Anti-Tank) was a Mobat with a 12.7mm L40A1 ranging gun, the same as the .50-caliber M8C spotting rifle used on the US 106mm M40-series recoilless rifles. The 120mm L6 Wombat (Weapon of Magnesium Battalion Anti-Tank) was a new weapon developed in the mid-1960s and saw the widest use of any weapon in the BAT-series. The Wombat, despite being 11.7ft (3.56m) long, was reasonably lightweight at 680lb (308kg) owing to the magnesium barrel and alloy components. (As a comparison the US 106mm M40A1 recoilless rifle weighed 462lb [209.5kg]). It also had an improved breech mechanism. It was towed by a Land Rover on a light two-wheel carriage with six or eight equipping a battalion. In mechanized infantry units it was mounted on the FV432 APC (armored personnel carrier). (Originally called the Trojan, but the name was dropped reputably for copyright reasons, but no doubt because it became the brunt of jokes owning to another "protective device" bearing the same name.) The Wombat mounted a 12.7mm L40A1 ranging gun. For its size it had only a 1,100-meter maximum effective range, but it would literally knock the armor off a tank with its heavy high-explosive squash head (HESH) projectile. No contemporary tank could withstand the Wombat. It also used HEAT and HE rounds. Its only combat use was in the Falklands in 1982.[48] The Mobat and/or Wombat were also used by Australia, New Zealand, Bahrain, Jordan, Kenya, Malaysia, and the UAE. They may still be held in reserve by some. They were declared obsolete in 1988 and replaced by the French-German-designed wire-guided Milan (*missile d'infanterie léger antichar*) infantry light antitank missile. (The US tested the 120mm XM89, XM105, and XM105E1 recoilless rifles in the early 1960s.)

The smallest: Several countries developed antitank rifles prior to World War II ranging from 7.9mm to 20mm. They were heavy, awkward, and by the beginning of the war, inadequate to penetrate the armor of all but the lightest tanks. When these rifles were developed they were the only

dedicated antitank weapons available to the infantry. HEAT warheads were just then being developed for rifle grenades. Lightweight shoulder-fired antitank rocket launchers would not appear in wide use until 1943. Despite their weight and bulk, antitank rifles were all the infantry had even though they were obsolete by 1940. The period's antitank rifle grenades were little better. Sweden developed a lighter weight alternative to the traditional antitank rifle. Work began in 1940 on a groundbreaking **20mm recoilless rifle**. The breech-loaded, shoulder-fired weapon was well ahead of its time. The Carl Gustav *2cm pansarvärnsgevär m/42* (antitank rifle) was provided with 20x180mmR AP and HE rounds with a 300-meter effective range. It was 55.1in (1,400mm) long and weighed 24.7lb (11.2kg), not much heavier than most squad light machine guns of the era. It was to replace the 120lb (54.3kg) *2cm pansarvärnskanon m/39* (antitank cannon) – the Swiss-made Solothurn s18-1000 antitank rifle firing a 20x138mmRB cartridge. The Swedish Army ordered 3,219 of the recoilless rifles to be issued on the basis of one per rifle platoon. However, problems were encountered with the first production pieces and only 1,000 were delivered between 1943 and 1945. While a lighter weapon than the antitank rifle, they still used a 20mm AP (hardened steel core) rather than a HEAT projectile and were obsolete by the time they were delivered. It was this weapon that paved the way for the excellent Carl Gustav 84mm-series of recoilless rifles of 1948, the *8.4cm granatgevär m/48* (grenade rifle) used worldwide and improved versions are still in use today.[49] Other than this 20mm weapon, the next smallest recoilless rifles were the US 57mm (2.24in) M18-series.

Are recoilless rifles REALLY recoilless?

Yes, they are, even though some claim it is not so, based on video "evidence" showing the weapons appearing to bounce somewhat when fired from the shoulder, and the impression given by the significant back blast. It just does not seem reasonable that something that makes that big of a blast is truly recoilless. However, this slight jolt is not caused by recoil. The author can attest that when the 57mm, 90mm, and 84mm recoilless rifles are fired from the shoulder there is no recoil. The firer is buffeted by the high pressure of the muzzle and back blasts, some of it being reflected off the ground. The blast is quite heavy and the noise ear-piercing; hearing

protection is essential when firing any kind of recoilless rifle. The widely used 84mm Carl Gustav recoilless rifle is so loud that in training a soldier can fire only six rounds a day. The assistant gunner moves some distance away from the overpressure zone so he too can fire six rounds that day.

What mainly causes the "bounce" or sudden movement of the weapon is the instantaneous combustion of several pounds of propellant and the instant departure of up to 7lb of projectile. Of course the weapon moves with that sudden absence of weight (projectile and propellant), but it's not from recoil. The same applies to shoulder-fired rocket launchers and recoilless projectors like the bazooka, *Panzerfaust,* and RPG-7.

Stories have long circulated about Chinese communist troops in Korea capturing US recoilless rifles. Turning the weapons on their former owners it is said that the loader stood behind the weapon as it was fired and he was duly blown away by the unexpected back blast. While no documentation has been found, this could well have occurred. The recoilless rifle was a new type of weapon with which the Chinese would have not had any experience and the back blast would have come as a surprise. The story was "updated" and also heard in Vietnam. There it is very unlikely to have occurred as recoilless rifles were already in the NVA and VC inventories and their principle well known.

The back blast is devastating and blows back in a blast cone to a considerable distance, which varies greatly between different models. It will blow out windows, strip bark from trees, snap low limbs, and break saplings. An effective demonstration is to stack a pile of empty wooden ammunition boxes 10ft behind the breech and firing. The robust boxes are blasted to splinters. The dust, smoke, and flash of the back blast creates a considerable firing signature and crews are trained to rapidly relocate after firing. It is a significant advantage, but it's a tradeoff in order to provide effective man-portable, highly destructive weapons.

There is a difference between a "recoilless rifle" and a "recoilless gun." The former has a rifled barrel and can fire spin-stabilized rounds as well as fin-stabilized rounds for certain types of ammunition, particularly shaped-charge projectiles for the former. Recoilless guns, a concept used in most Communist Bloc recoilless weapons (Soviet, Czechoslovak, some Chinese), had smoothbore barrels relying completely on fin-stabilized projectiles.

What was the PIAT?

The Mk I Projector, Infantry, Anti-Tank (PIAT) (pronounced "pee-at") entered British Commonwealth service in 1943 seeing its first combat in Canadian hands during the invasion of Sicily in July. It replaced the 0.55in Mk I Boys antitank rifle with one issued to each rifle platoon. Some 115,000 of this curious weapon were produced by Buxton Lime Firms Company of Imperial Chemical Industries Limited. The PIAT was a unique spigot-type bomb discharger. While effective, it had its drawbacks, amongst which is that it was just plain ugly. Appearance of course should not be a criteria for an effective weapon … but just look at it! At 31.7lb (14.4kg) it was heavy, but it was only 39in (990mm) long. Its effective range against tanks was 110yd (100m), but it could hit building-size targets at 350yd (320m). The 3.5in (87mm) HEAT bomb could penetrate 4ins (100mm) of armor. It was constructed of poor quality metals and while robust, was poorly engineered. It had a very hard trigger pull requiring two fingers. If the sensitive bomb was dropped it might detonate. It did have its advantages though. Unlike bazooka-type rocket weapons, the PIAT could be fired from inside a building, plus there was no revealing back blast or noteworthy smoke signature. These were its only two advantages.

Provided a monopod (a one-legged mount), it was shoulder-fired prone from the ground. The PIAT's firing mechanism was its main drawback; and did I mention that it was just plain ugly? The firing mechanism consisted of a powerful spring, which threw a heavy steel rod forward. The rod struck the rear of the bomb, ignited a small propulsion charge, and launched the bomb. The heavy rod, called the spigot, damped out the recoil of the round being launched. The detonation of the propulsion charge was also intended to reset the launching spring, meaning that the weapon had to be cocked only once, which was difficult by hand. If the bomb was not properly seated in the open-topped launch tray (bomb support) it might not launch or the charge would fail to reset the spigot rod. In that case it had to be manually re-cocked by pulling up on the tube while standing on the handle-like shoulder rest. This usually required the operator to move to adequate cover as he had to stand or lie on his back to accomplish this. Re-cocking required a 200lb (91kg) pull. The 1943 PIAT manual 26/GS/935 prescribed:

> Lie on the back and rest the projector on the chest, with the bomb support pointing over one shoulder and the shoulder piece flat on the ground. Keep the front support clear of the body and arms. Place the insteps on the shoulder piece, one foot on each side of the outer casing. Grasp the trigger guard firmly with one hand from underneath; with the other grasp any part of the projector that will give good leverage. Sit up or bend the knees if necessary, according to cover. Pull the outer casing away from the shoulder piece and turn it anticlockwise as far as it will go. Pulling with the hands and pushing with the feet, continue to pull on the outer casing until a click is heard. Considerable effort is required to overcome the resistance of the mainspring. The click denotes the action is cocked.

The PIAT was not as effective as the US 2.36in M1 and later bazookas, and cost more to produce, but nevertheless the Commonwealth went with the PIAT. Better that two bazookas could have been made from the materials required for a single PIAT. Six-hundred M1 bazookas were delivered to the British at Suez in September 1942. They were tested and deemed unsuited for desert warfare. It was reasoned that infantrymen could not approach German armor due to the lack of concealment in the desert. Apparently, not considered was the bazooka's value as a defensive weapon when a position was attacked by tanks, or its ease of maneuver allowing the gunner to stalk tanks and gain an advantageous firing position against a tank's vulnerable quadrants. In the end the Lend-Lease bazookas were simply placed in storage. Training on the PIAT was suspended at the end of the war and they too were placed in storage being considered too dangerous for peacetime use. New Belgian-designed Mecar antitank rifle grenades were relied on for platoon antitank defense, which were inadequate. Some PIATs were taken to Korea as Commonwealth platoon antitank weapons. In 1950/51 it was replaced in Korea by the US-supplied 3.5in M20 bazooka, which the British called the M20 Mk I. The Swedish Carl Gustav 84mm L14A1 recoilless rifle, what they called an "infantry antitank gun," was introduced into Commonwealth service in 1962 as the new platoon antitank weapon. The 3.5in M20 Mk II (M20A1) remained in British service into the early 1970s before it was fully replaced.

What was the POM-POM GUN?

This was the **Maxim-Nordenfelt 37mm** (1.457in) or 1-pdr automatic cannon developed by Hiram Maxim of machine gun fame. It was a much scaled up version of his rifle-caliber machine guns. Like those weapons, it was water-cooled and typically mounted on an artillery-style two-wheel carriage. They were also built by Maxim, Vickers and Sons in Britain and by the German firm, DWM – Mauser. The guns were introduced in 1897.

This caliber was chosen because of restrictions imposed by the St Petersburg's Declaration of 1868 and the Hague Convention of 1899, which limited high-explosive projectiles smaller than 1lb (actually 400g) being used against personnel, especially high-explosive rifle-caliber bullets.

Initially rejected by the British, the Maxim became well known when the British faced them in the hands of the Boers during the Second Boer War (1899–1902) in South Africa. With limited cover or concealment on the sprawling veldt, British troops in the open and in lightly constructed positions suffered greatly from the pom-pom's long-range high-explosive fire. It was at this time that the Tommy christened the guns the "pom-pom" owing to the rythmic thump of it firing. It was not long before the British received 50 of the guns from Vickers. They came into wider use during World War I mounted on ships as torpedo boat destroyers and as the first antiaircraft and anti-zeppelin guns, known as "ack-ack." That term is said to be named after the sound of AA guns firing, but "ACK" was the British phonetic alphabet word for "A." During World War I the Germans employed them in the AA role as the Maxim Flak M.14. Ground guns fell from use owing to their awkwardness and weight. Additionally, the 1-pdr shell was ineffective against improved field fortifications. Later 1½-pdr and 2-pdr multiple-gun naval antiaircraft versions came into use. They were used throughout World War II gradually being replaced by modern 20mm and 40mm AA guns.

What was the "VITAMIN PILL" grenade launcher cartridge?

The World War II US **M7 auxiliary grenade launcher cartridge** was nicknamed the "vitamin pill." It was designed to be inserted in the muzzle of M1 (M1903 rifle), M2 (M1917 rifle), and M7-series (M1 rifle) rifle

grenade launchers to boost the grenade's range by 60–100yd (a 30–50 percent increase) and added 40–90ft/sec to its velocity depending on the grenade model. It was inserted mouth first in the muzzle of the grenade launcher with the rim retaining it. The M7 case was expelled when the grenade was launched with a normal M3 launcher cartridge. The M7 was standardized on January 6, 1944, but had been in field use since late 1943 as the T18. The M7 looked like a .45-caliber rimmed revolver cartridge (it was actually a first draw casing used in the manufacture of .45-caliber pistol cartridges), but had a small sealed hole in the head rather than a primer and a red enameled wad in the rolled crimp case mouth. It was loaded with 20 grains of smokeless propellant. The M7 cartridge could not be used in the M8 launcher on carbines as the tube's internal diameter was too small (0.40in; the M1 and M7 launchers' were 0.50in and the M2 was 0.47in). This was intentional, as the use of an auxiliary cartridge on a carbine would damage the stock or action.

The "vitamin pill" was also not to be used with rifle-launched ground pyrotechnic signals (parachute colored flares and free-falling star clusters) for any rifle as they had an integral auxiliary propellant charge and the auxiliary cartridge's ignition would damage it. Rifle grenades could not be fired from the shoulder when using the M7 cartridge because of the heavy recoil. The "vitamin pill" cartridge is an unusual concept and no other country has used anything like it.

Why are most US mortars of basically the same design?

Mortars are meant to be comparatively lightweight and simple to operate. With the exception of the four models (M1, M1A1, M2, M30) of the rifled 4.2in mortars, most US mortars are very similar in design; a tube, base plate, and bipod plus a pair of small recoil cylinders and the sight mounted on the left. The basic design of today's mortars originated in World War I from the British 3 and 4in trench mortars designed by F. W. C. Stokes (later Sir Wilfred Stokes, 1860– 1927). These mortars were adopted by the US in 1917 and 1918, respectively. The 4in, intended to fire only gas and smoke shells, fell from use after the war, but was modified as the first of the 4.2in rifled chemical mortar series in 1928 as the M1, likewise intended to fire chemical warfare agents and smoke. The "four-deuce" mortars were of

somewhat unconventional design using a monopod and large rectangular base mounting rather than a bipod and small square base plate. The 4.2in M1A1 version was adopted in 1935 and the M2 in 1942. They were approved to fire HE in 1942 to make them more versatile support weapons.

The Stokes **3in Mk 1A2** remained in use with US forces until the early days of World War II seeing use in the defense of the Philippines and as a training weapon. The 3in was actually 81mm (3.2in) and not 76mm; this applies to the British 3in mortar used from World War I through World War II and the Korean War. (See "The 3in mortar ain't.") At the beginning of World War II the 3in Mk 1A2 was already in the process of being replaced by the **60mm M2** and **81mm M1** mortars at company and battalion-levels, respectively. They were adopted in 1939 and 1937. Both of these weapons were license-built copies of French Brandt Mle 35 and Mle 31 mortars of the same calibers. Edgar W. Brandt (1889–1960) much improved the basic Stokes design. From the 1930s the 81mm Brandt was adopted virtually worldwide with slight variations and variously called 8cm, 81mm, 81.4mm, and 82mm, but all were 81mm and the ammunition was generally interchangeable … except the Soviet 82mm. The US replaced the 60mm M2 with the **60mm M19** just after World War II and the 81mm M1 with the **81mm M29** in 1952. The **81mm M29A1**, with a hard chrome-plated bore to prolong barrel life, was standardized in 1964. These were still essentially of the traditional Brandt design. Even the big 105mm T17 and 155mm T25 mortars combat-tested in World War II were but scaled up models of the basic Brandt design.

The 60mm M19 and 81mm M29 mortars in turn were replaced by the US-designed **60mm M224** lightweight company mortar in 1977 and the British-designed **81mm M252** medium extended-range mortar in 1984, aka the Improved 81mm (I-81mm). The British 81mm L16A1/A2, from which the M252 was copied with modifications, had been fielded in 1961. While longer ranged and using much enhanced ammunition, the improved 60mm and 81mm mortars still differed little from their predecessors' basic Stokes/Brandt roots. The lightened **60mm M224A1** was introduced in 2010.

The **120mm M120/M121** battalion mortar system finally replaced the 4.2in (107mm) M30in 1990, which was long overdue for replacement.[50] They too are nothing more than a scaled up 81mm Stokes-Brandt design. The US 120mm was developed from the Israeli 120mm Soltam K6, which

itself was developed from the Finnish 120mm Tampella B m/74. The Tampella was a development of the Brandt design used by France, the 120mm Mle 1935. By the way, the Soviet 120mm PM-38 was copied from the Mle 1935, but with a different mount. The Germans in turn copied the PM-38 as the 12cm GrW.42. For once the Americans have managed to keep it simple and retain a tried and proven design concept.

The Marine Corps is developing the **120mm XM326** Dragonfire expeditionary mortar system. This is a revolutionary automatically fed, remotely fired mortar based on the French 120mm Thomson Daimler 2R2M and is of a much different design than the traditional Stokes-Brandt. Being rifled, it uses entirely different ammunition from the 120mm M120/M121.

Why is the US 81mm mortar base plate called the "CANADIAN BASE PLATE"?

The US fielded the **81mm M29 mortar** in 1952 with a heavy two-piece circular M23-series base plate. During combined exercises with Canadian forces in the early 1960s US troops were introduced to the lightweight circular Mk 1 base plate that the Canadians were using with the British-designed 81mm L16A1 mortar, which the Canadians called the C3 mortar. The value of the lightweight base plate was realized and testing proved it provided just as stable a firing base as did the heavier and bulkier M23-series. It was standardized as the M3 base plate for the M29A1 mortar and is also used with the 81mm M252 medium extended-range mortar, adopted in 1984, which was copied from the British L16A2 for which the base plate had originally been designed. With the adoption of the M252 the term "Canadian base plate" has fallen from general use. A scaled down version of the M3 base plate is found in the M8 base plate of the current 60mm M224 lightweight company mortar.

How did the US end up with a 4.2in MORTAR?

The 4.2in (107mm) mortar is kind of an odd caliber. The **4.2in M1 mortar** was developed by the Chemical Corps in 1924–28 as a rifled mortar to

deliver chemical warfare agents and smoke. The barrel of the British-designed Stokes 4in (102mm) Mk I mortar, in use by the US Army since 1918, was used as the basis for the new mortar. The 4in was smoothbore. After factory rifling it had a 4.2in bore and was used with the M1 (1928) and M1A1 (1935) chemical mortars. Rifling was added in a successful effort to improve the mortar's range and accuracy. The M2 (1943) "four-deuce" or "four-point-two" was used through World War II and the Korean War when it began to be replaced by the much improved, but even heavier, 4.2in M30 in 1951. The 4.2in M4 (1944) recoilless mortar saw only limited combat testing. In Vietnamese service during the late 1950s and early 1960s the 4.2in mortar was known as the 104mm in order to provide them with a metric designation. This is well before the US began using the 107mm designation.

In 1962 the Marine Corps adopted the 107mm M98 mortar, a 4.2in M30 mortar barrel mounted on the modified two-wheel M8 carriage of the 75mm M116 (formally M1A1) pack howitzer. This weapon was more commonly known as the "howtar" – contraction of howitzer and mortar. It was to replace the 4.2in M30 mortar, which the Marines had assigned to infantry regiments since 1949 (the 4.2in M2 used until the mid-1950s). The "four-deuces" were placed in storage. The "howtar" was the first time the 107mm designation was applied to the 4.2in. Six "howtars" were assigned to a fourth battery in Marine division 105mm howitzer battalions. It began to be re-replaced by the 4.2in M30 in 1967 as it was decided that it was actually a more flexible weapon and the "howtars" were gone by 1969. The Marines eliminated the 4.2in mortar altogether in 1972. The "howtar" and the 4.2in could not provide the range and massed fires necessary to be effective artillery pieces, something the US Army had learned in the late 1950s. In the Marines both the 107mm "howtar" and 4.2in mortar had been substituted for artillery as they could be easily helicoptered ashore during amphibious assaults and carried in assault amphibian vehicles.

In 1970, the Army was going to officially change the designation of the 4.2in M30 mortar to 107mm as it converted to the metric system, but the new FM (Field Manual) 21-92, June 10, 1970, was issued with "4.2in" still printed on the cover, so the change was not officially made, although it was called a 107mm in some other publications of the period. There was also an experimental 107mm XM95 mortar designed to fire a modified boosted

4.2in round to achieve longer range. The XM95 used a modified 4.2in M30 mortar barrel.

As an aside, the British used the smoothbore 4.2in Mk 1 mortar in World War II and the Korean War, and the Soviets and North Koreans used the smoothbore 107mm PBHM-38 mortar from World War II. The US, British, and Soviet rounds were not interchangeable; all three 107mm/4.2in rounds are of entirely different design.

Do the projectiles of BRITISH weapons designated in the "POUNDER" system actually WEIGH THEIR ADVERTISED WEIGHT?

During World War II some large-caliber British weapons were designated by a **"pounder"** system rather than metric or inch caliber. This was a traditional system dating back to muzzle-loading, black powder cannon days when guns were designated by the weight of the solid shot cannonball they threw. This was an entirely different weight/caliber system than that used in modern weapons and there were different systems in use during overlapping periods (a 1-pounder smoothbore shot might be: 1.923, 2.003, or 2.019in in diameter for example). Additionally, guns were designated by pounds and howitzers by inches, although this distinction was sometimes murky. Officially "pounder" was abbreviated "pr" (not to be confused with "pair"), but even in official documents and correspondence it was more commonly found as "pdr" These weapons should *never* be identified by "lb." There is no mathematical means of determining a modern weapon's caliber from its "pounder" designation, that is, there was no standard weight-to-caliber formula. The projectile's design affected weight. The projectile weight is for the high-explosive or armor-piercing (if an antitank or tank gun) round, which does indeed weigh about that of its designation. A specific weapon's pound designation was often rounded off from the projectile's actual weight, but was usually within half a pound. Some of these weapons date back to World War I, but most were used in World War II and some even later. After the war and with NATO standardization the British armed forces adopted the metric system, even before it was nationally adopted in 1965. Older weapons remaining in service retained their "pounder" and "inch" designations until phased out. The metric and

inch calibers of various British weapons designated by pounds are as follows:

Weapon	Millimeters	Inches	Projectile Weight
2-pdr antitank, tank, & AA guns	40mm	1.57in	2.37lb
3-pdr tank gun*	47mm	1.85in	3.24lb
6-pdr antitank & tank guns	57mm	2.24in	6.28lb
13-pdr field gun†	76.2mm	3in	12.5lb
17-pdr antitank & tank guns	76.2mm	3in	17lb
18-pdr field gun	83.8mm	3.33in	18.5lb
20-pdr tank gun	83.4mm	3.28in	20.06lb
25-pdr field gun-howitzer	87.6mm	3.45in	25lb
32-pdr antitank & tank guns‡	93.4mm	3.67in	32lb
60-pdr field gun	127mm	5in	60lb

* Pre-World War II limited use tank gun.
† World War I gun seeing limited second-line use in World War II.
‡ Post-war developmental effort to adapt the 3.7in antiaircraft gun to antitank and tank guns.

Why were some US ARTILLERY pieces designated by MILLIMETERS and others by INCHES?

At the turn of the 20th century, there were three primary countries producing artillery pieces that were widely exported: Britain, Germany, and France. Britain designated its artillery using inches, although some were

designated in the “pounder” system described above. Germany designated its artillery in centimeters (as did Austro-Hungry, another era’s major merchants of death) and the French in millimeters. Czechoslovakia became a major artillery supplier after World War I and used millimeters too.

The US had previously used a pound system for its muzzle-loading artillery, but some were also designated in inches. With the advent of breech-loading artillery, inches exclusively were used by the US. World War I caught the US totally unprepared for modern warfare in Europe and without adequate artillery in numbers and capabilities. It also lacked the plants to rapidly produce such pieces. The US turned to France and Britain to supply the masses of artillery needed to arm the American Expeditionary Force. Both countries had a surplus of artillery and production had continued in expectation of a longer war. The US adopted the French 75mm (2.95in) field gun, 155mm (6.1in) gun and howitzer, and 240mm (9.4in) howitzer. At the same time the US adopted the British 8in (203mm) howitzer and a 9.2in (234mm) howitzer. The US retained the original French metric and British inch designations for the respective weapons. After the Great War the US continued to mainly use modified French-designed weapons now license-produced in the States.

Between the wars the US-designed modern replacements largely based on the French models. They designated them in millimeters and added the 105mm (4.13in) in 1940, which was coming into wider use as light artillery and replacing the old standard 75mm in many armies. A US-designed 75mm pack howitzer was developed prior to and used through World War II. The US had quickly rid itself of the redundant and shorter ranged British 9.2in while retaining the French 240mm (the 9.2in had only been used to augment 240mm howitzers as insufficient numbers were available). The US 8in gun and howitzer designations were retained as the original had been the British 8in howitzer; the 8in gun was a post-World War I US design (and phased out after World War II). The story continues when the US adopted the 4.5in (115mm) M1 gun in 1941. It was originally going to be 4.7in (120mm) – the US had used a 4.7in gun from 1906 – but the existing British 4.5in round was adopted for standardization purposes.[51] It proved to be an inadequate counterbattery weapon owing to a small explosive charge and was declared obsolete at the end of the war. While the 8in howitzer was never officially redesignated 203mm, it was frequently referred to as such from at least the 1970s. NATO countries using the US “eight-incher” did,

and still do, call it the 203mm. The only new artillery calibers introduced into US service since World War II were the 280mm (11in) M65 “atomic cannon” (replacing the 240mm M1 howitzer – 1952–63) and 175mm (6.8in) M107 self-propelled gun (replacing the 8in M1 gun – 1962–81).

The same “rule” also applied to mortars. In World War I the US used British 3, 4, and 6in mortars eventually resulting in the 3in (actually 3.2in – 81mm) and 4.2in (a modified 4in) employed in the post-war years by the US. Just prior to World War II the US adopted French 60mm and 81mm mortars and retained those caliber designations while only the 4.2in with British roots was retained. Subsequent mortars were designated in millimeters and the 4.2in mortar was semi-officially called 107mm from the 1970s. In the 1960s a modified 4.2in breech-loading mortar was fielded on a howitzer-type carriage as the 107mm howtar. Currently the US uses 60mm, 81mm, and 120mm mortars. The US 120mm traces its origins back through a sequence of Israeli, Finnish, and French designs.

Antiaircraft guns were mostly designated in millimeters. The beginning of World War II found the US with 1.1in (28mm), 37mm, and 3in AA guns; the original US 3in AA gun was based on a British “three-incher” design and the 1.1in quad was a US Navy design. They were phased out by 20mm (Swiss-design), 40mm (Swedish-design), 90mm, 105mm (very limited use), and 120mm guns, the last three being domestic designs. The navy continued to use 3 and 5in antiaircraft and dual-purpose guns beyond World War II. A 75mm AA gun, the “Skysweeper,” saw service from 1951 to 1960 being the last conventional AA gun adopted by the US, although the 40mm remained in use into the 1980s.[52]

The US Navy continues to use its traditional inches to designate its shipboard guns, but they are now often referred to by the metric caliber. They used 3, 4, 5, 6, 8, 12, 14, and 16in guns through World War II. The only large-caliber guns in use by the US Navy today are the 76mm (3in) and 127mm (5in) dual-purpose designs.

US tank guns have traditionally been designated in millimeters and have included since pre-World War II days to present: 37mm (German-design), 75mm, 76mm, 90mm, 105mm (British-design), 120mm (German-design), and 152mm (which also launched Shillelagh antitank missiles).

US towed antitank guns have included: 37mm (German-design), 57mm (British-design – 6-pdr), 3in (developed from the AA gun), and an experimental 90mm. US recoilless rifles have included the 57mm, 75mm,

83mm, 84mm (Swedish-design), 90mm, 105mm, 106mm, and the experimental 120mm plus an experimental 105mm recoilless howitzer.

Under NATO standardization US weapons will continue to be designated in millimeters.

Why are weapons' magazines sometimes called "CLIPS"?

A magazine, or simply "mag" in modern colloquialism, is a spring-loaded metal or plastic housing – box, curved ("banana"), or circular ("drum" or "pan") in shape – containing ammunition that is inserted into a weapon. A magazine "feeds" the weapon ammunition. Straight "box magazines" and even "curved magazines" are sometimes called "stick magazines," especially if they are long and comparatively narrow. Technically "curved magazines" are considered box magazines. Circular or "drum" magazines fitted horizontally atop weapons were often referred to as "pan magazines." Magazines can also be "internal" or "fixed" in box, tubular (under-the-barrel or in-stock), or rotary form. The term was borrowed from the name of structures and compartments for storing ammunition on land or aboard a ship. "Magazine" was derived from the Arabic *makahazin* (warehouse).

The term magazine is also applied to ammunition containers holding belted ammunition and attached to machine guns. The US M60 machine gun's little-used "magazine" was actually a clip-on, vinyl-coated, nylon fabric bag containing a 100-round belt of the type commonly referred to as an "ammo bag." The German MG.34 and MG.42 machine guns used "basket magazines" (*Gurttrommel*), a cylindrical metal container which held a 50-round belt. The Soviet 7.62mm RPD light machine gun used a metal circular drum magazine holding a 100-round belt. The back of both of these magazines hinged open and the rolled up belt could be inserted. The US M249 SAW is provided with a plastic box magazine for a 200-round belt as well as 100- and 200-round nylon fabric "soft packs" or "assault bags."

Detachable magazines are sometimes called "clips" or even "magazine clips," but both terms are incorrect and amateurish. Magazines have an integral spring attached to the magazine follower, the platform on which the cartridges rest, and are pushed upward, clips do not. A clip is a metal strip, sometimes with high side walls, that retains cartridges by their rims

allowing them to be loaded into the weapon by stripping the cartridges directly into a weapon's internal or fixed magazine – a "stripper clip," "loading clip," "charger clip," "charging clip," or "magazine charger" – to allow for rapid reloading rather than loading one round at a time. The first rifle to use a Mauser-designed stripper clip was the Belgium Mauser 7.65x54mm Mle 1889 and was used until the mid-1930s. Clip guides were machined into the weapon's receiver to allow charging clips to be used. The pressed metal clips were low cost and were discarded after loading. Some weapons with detachable magazines could also be loaded with stripper clips while the magazine was still inserted in the weapon, the M14 rifle for example. Most marks of British Lee Enfield rifles had a 10-round detachable magazine, but were routinely loaded using charging clips – riflemen did not carry any spare magazines. Rifles, carbines, and pistols can be found with magazines that use loading clips. Some detachable magazines may be loaded by inserting clips into an "adapter," "clip guide," or "magazine loading device" temporarily attached to the magazine's mouth. "Spoon adapters" were issued with clipped ammunition to allow the M1/M2 carbine, M14 rifle, and M16/M4 rifle/carbine detached magazines to be filled by charger clips. US charger clips hold five (7.62mm, .30-06) or ten (5.56mm, .30 Carbine) rounds. The M1/M2 carbine charger clips were not available until after World War II.

With the early 1880/90s magazine-fed bolt-action rifles it was envisioned that the magazine would be an ammunition "reserve" and that the soldier would normally fire loading rounds singly. This was a holdover concept from using single-shot breech-loading rifles; similar to the early desire of retaining sails on steamships. Magazine cutoffs were even provided in early bolt-actions allowing single-shot loading. The reality was that a soldier fired his way through the magazine to provide a more rapid fire and simply to avoid the repetitious task of fishing out cartridges and loading them one at a time. Stripper clips made this practical.

Some weapons required a special clip with high sides that was inserted filled with cartridges into the weapon's internal magazine. The weapon could not be loaded or operated without the clip, which was ejected with the last spent cartridge case. This made the loading clip a fundamental part of the weapon. These were sometimes referred to as *en bloc* clips, French for "all together." Examples of rifles and carbines using *en bloc* loading clips include the US .30-caliber Garand M1 (eight-round), French 8mm Lebel-

Berthier (three- and five-round depending on model), Italian 6.5mm and 7.35mm Mannlicher-Carcano (six-round), Austrian 8mm Steyr- Mannlicher (five-round), and the Soviet 14.5mm PTRS-41 semiautomatic antitank rifle (five-round). These clips could be inserted into the magazine from either of the clip's ends. One machine gun used rifle charger clips as a feed means, the Japanese Nambu Taisho Type 11 (1922) light machine gun, which had a feed hopper that accepted six five-round clips as used with the Arisaka 6.5mm Meiji Type 38 (1905) rifle. The several models of Italian 6.5mm Fiat-Ravelli machine guns used a 20-round charging clip to load their fixed magazines, a rather slow and cumbersome loading system. For weapons requiring *en bloc* loading clips the ammunition was issued already clipped and so marked on the boxes.

MACHINE GUN BELTS; what are the different types?

Machine gun belts are of several different types and made of different materials. Their designs are usually for a specific machine gun, but since World War II different makes of guns can accept a standard belt for a given caliber. Early on most were "fabric belts" made of cotton webbing and might have been white, khaki, tan, or green. These had woven loops in which the cartridges were inserted. The "fabric and metallic belt" was a web strip with metal brackets riveted to it to better retain cartridges. This type was used in Czechoslovak and the British Besa guns among others. Then there was "metallic-link belt" of the "non-disintegrating" type. Web belts had the disadvantage of soaking up water, which could cause jams, and would eventually wear out with reuse. Cartridges could slip out or become incorrectly positioned. Metallic-link belts issued in set lengths were comprised of metal cartridge-holder links connected by tiny rings, five rings in the case of German belts. In World War I the Germans used both web and non-disintegrating belts with aluminum links. Often machine gun ammunition was issued unbelted and the crews had to load the belts. Belts were part of the gun's accessories and were not discarded when empty, but retained and reloaded. Crews took pains not to lose the belts as replacements were often scarce. There were both hand-operated and electric-powered belting or linking machines to speed up the otherwise slow process. These were mainly available to aviation units and not infantrymen.

The first was designed for Vickers aircraft guns in 1916 by William de Courcy Prideaux, a Frenchman residing in Britain better known for inventing speed loaders for revolves in the early 1890s. “Disintegrating metallic-link belts” were originally developed for use in aircraft machine guns where the expended loose end of the belt was a problem flapping in the breeze or jamming up inside the gun compartment as it fed through the gun. Cartridges held the links together and when the cartridge was loaded the links simply fell apart and were discharged though a port along with expended cartridge cases. Many armies eventually adopted them for ground gun use. Machine gun ammunition was issued already loaded in the disintegrating metallic-link belt. NATO uses standardized links now, the M9 for .50-caliber (12.7mm), M13 for 7.62mm (DM13 in Germany), and M27 for 5.56mm, as do other countries using these calibers. An advantage of this type of belt is that with a “runaway gun,” i.e., an overheated gun that continues to fire after the trigger is released; the belt can be grabbed and sharply twisted to break it as its feeds through the gun rather than having to let the entire belt run through. Soviet/Russian machine guns use non-disintegrating metallic-linked belts. Belts are issued in various lengths with 50- and 100-round being common. Longer lengths were issued previously; the Germans issued 50- and 250-round belts in World War II, for example. Belts, regardless of type, can be linked together by inserting a cartridge through a loop or link. There is also usually a feed tab on one end to aid with loading the belt into the gun. There were also “feed strips.” These were sheet metal strips with cartridge brackets stamped into them. They were used mainly in early French and British Hotchkiss machine guns and World War II Japanese Nambu guns. These were ejected when the last round was fired and another strip fed in at the same time. The French 8mm Hotchkiss used 24- and 30-round strips plus they developed a 250-round “belt” of short “articulated” strips linked together by small metal rings. The British used .303in 9-, 14-, 30-, 50-, 54-, and 60-round strips (for different purposes; cavalry and tank guns used different lengths for instance), and the Japanese 6.5mm and 7.7mm Nambu (modified Hotchkiss) a 30-round strip. The Italian Fiat-Revelli heavy machine gun used a 20-round feed strip.

Have you ever noticed that virtually all US, German, and most other nations’ machine guns have left-hand belt feed, but that Soviet/Russian

machine guns feed from the right. Maxim guns, including the British Vickers and German Spandau, had right-hand feed. It appears the Russians, an early Maxim user, simply continued to make machine guns with right-hand feed while others switched to left-hand feed? The reason left-hand feed was preferred is because it is more ergonomically efficient for a right-handed assistant gunner to feed the belt into the gun. (It should be noted that some tank coaxial and aircraft installations have been converted to right-hand feed and that some models of Browning .50-caliber machine guns can be converted to right-hand feed by simply reassembling certain feed parts in a different arrangement.)

Why did the Germans not make wider use of the MG.34's "SADDLE DRUM" MAGAZINE?

The **7.9mm MG.34 machine gun** was originally provided with a 75-round double-drum cartridge magazine (*Patronentrommel 34*), often called the "saddle drum." In 1941 they were withdrawn from use. It may seem odd to withdraw a larger capacity magazine and replace it with the already in use 50-round drum containing a belt. However, the saddle drum magazines were expensive, added excessive weight to the weapon, and were prone to jamming. It required a special feed cover (*Deckle mit Trommelhalter*) to replace the standard cover, which when fitted prevented belt-fed operation. The cover had to again be replaced to use belts. A special magazine loading machine (*Trommelfüller 34*) was necessary to load the magazine, which too was expensive and added to the weight and amount of paraphernalia the crew had to carry. Interestingly the rounds were fed alternatively from each side so that the gun would not become unbalanced if one side of the drum was emptied first. The cartridges were loaded singly in the spring-fed magazine unlike the 50-round basket drum (*Gurttrommel 34*), which held a belt that was merely rolled up and placed into the drum's hinged back opening. The saddle drum was a holdover concept from the 7.9mm MG.13, which was replaced by the MG.34 in 1936. (The MG.13 also used a 25-round curved box magazine.) The two guns' saddle drums were not interchangeable. The MG.34's saddle drum was used on the Luftwaffe's

MG.15 aircraft machine gun, but these inadequate guns were largely replaced in 1943 by the MG.81, based on the MG.34, using a 500-round belt. It was “inconvenient” to have to change the MG.15’s 75-round drum when a bomber was under fighter attack. The magazines were stowed in nooks and crannies all over the bomber. The MG.17 was a 1936 modification of the MG.15 allowing it to use belts and magazines. Many MG.15’s were converted to the ground role for use by Luftwaffe field divisions and airfield defense units, so the 75-round saddle drum remained in limited use with these weapons through the war. The 75-round saddle drum had one benefit in that it was intended mainly for air defense use. Since there was no belt drag resistance, the gun fired faster, a benefit for an antiaircraft gun, but a shortcoming for an already fast-firing infantry gun.

Why was the Johnson rifle not selected over the M1 Garand?

The Marine Corps made very limited use of the **Johnson .30-caliber M1941 rifle** from 1942–43. It was a short-recoil, semiautomatic design with a 10-round rotary magazine loaded by two five-round charging clips (the same as used by the M1903 Springfield) or rounds could be loaded singly. It was designed by a Marine Reservist (transferred to the Army Reserve after the war), Colonel Melvin M. Johnson, Jr. (1909–65), who also developed the M1941 and M1944 light machine guns. Some Johnsons were issued to the Marine 1st Parachute Battalion on a very limited basis and saw use alongside M1903 rifles on Guadalcanal in 1942. The 1st Parachute Battalion went ashore with just 23 Johnson rifles, one per squad. A very few were used by other Marine parachute and raider battalions and it is reported some were used by the OSS. A quantity of Johnsons had been ordered by the Netherlands East Indies Army in 1940 and by Chile in 7x57mm Mauser in 1941. The Netherlands East Indies’ Johnsons were impounded after Pearl Harbor and turned over to the Marines. Others were produced to fulfill Marine Corps orders. The Johnsons were withdrawn in 1943 when sufficient M1 Garands became available.

There was a push by proponents to adopt the Johnson to augment M1 production, but it was determined that M1 production could be increased and the idea of two different standard service rifles, plus the M1 carbine, was less than wise logistically – too many spare parts in the inventory, and

not a single part was interchangeable between the three shoulder weapons. M1 rifle series production had begun in 1937. Additionally, the Johnson was considered too flimsy and the short-recoiling barrel prevented rifle grenades from being fired, which the Marines considered valuable. A short-recoil system is fine for machine guns, but not a good choice for a rifle. It also allowed for only a short, lightweight bayonet to be fitted, which Marines called a "tent peg." The bayonet had no grip preventing it from being used as a fighting or utility knife. Both the Johnson and the M1 weighed 9.5lb (4.3kg) and the Johnson was about 2¼in longer than the M1, another minus. Basically the Johnson was a good design, but not as a combat rifle.

The M1941 rifle was never officially adopted and the designation was assigned by the Johnson Automatics Company. The Army Ordnance Department, which assigned official designations, even to most Marine weapons, had ceased using year designations in 1925. If it had been adopted it would probably have been designated the "M2 rifle." The CIA-sponsored Free-Cuban *Brigada de Assalto 2506* was armed with Johnson M1941 rifles during the ill-fated 1961 Bay of Pigs invasion.[53]

Were US World War II submachine gun MAGAZINES INTERCHANGEABLE?

During World War II the US used several models of .45-caliber submachine guns. The Thompson M1928A1 (cocking handle on the top) used a 20-round magazine. A 50-round drum was issued early in the war, but fell from use owing to its weight (4lbs, 13oz [6.5kg] loaded), high cost, rattling noise (due to loose cartridges), slow reloading time, and its propensity for jamming. (There was also an extremely bulky 100-round drum, but it was not used by the military. The commercial designation of these magazines was Type "XX," "L," and "C" – 20-, 50-, and 100-round magazines respectively.) There was also a special police 18-round (Type "XVIII") magazine for the longer Peters-Thompson birdshot-loaded riot cartridge. The Marines and US Navy used the Thompson Model 1921 through the 1920s and it used the same magazines. The Army first purchased Model 1928 Thompsons in 1932 as "non-essential limited procurement" weapons. In 1936 it was standardized and the military version officially designated

the M1928A1 in 1938. The Thompson M1 and M1A1 submachine guns (cocking handle on the right side) were introduced in 1941 and issued with 30-round magazines. They could accept the old 20-round box magazine, but *not* the 50-round drum. The M1928A1 could accept the new 30-round magazine.

The M3 (T20)* and M3A1 (M3E1) "grease guns" of late 1942 and late 1944 respectively, (the M3 was first used in Normandy and the M3A1 did not see World War II combat duty) used a 30-round magazine different from the Thompson's and could not accept Thompson magazines nor could Thompsons take a grease gun's. The reason for this was that there had been complaints that Thompson magazines were too easily damaged so a much more robust magazine was designed for the M3.

The Marine Corps used Reising M50 and M55 submachine guns with 12- and 20-round magazines from 1942–43 as a stopgap measure as substitutes for Thompsons and M1 carbines until they became available. The 12-round was only used in training. Reising magazines could not be used in any other submachine gun nor could the Reising submachine gun accept others' magazines.

The Hyde-Inland M2 submachine gun was developed by Marlin Firearms in 1942 as an alternative in the event that the Ordnance Department-designed M3 was unsuccessful. Only 500 M2s were produced and while adopted as a substitute standard, none were issued. The M2 used the 20- and 30-round magazines of the Thompson M1928A1, M1, and M1A1.

One other submachine gun saw limited US service, the United Defense Supply Corporation's M42. This was a 9mm weapon and only issued to OSS-supported resistance groups. It used a 25-round magazine that was not interchangeable with any other weapon.

Loaded .45-caliber submachine gun magazines are notoriously heavy compared to 9mm magazines, which are not exactly lightweight. This is because .45-caliber magazines tend to be more robustly constructed, contain more metal, and a complete .45-caliber cartridge is almost twice as heavy as a 9mm (331 grains compared to the 9mm's 179 grains).

FACT:
Since we are on the subject of magazine interchangeability, it is not common knowledge that soon after NATO standardized the

5.56x45mm round in 1980 it also adopted a standard magazine (STANAG 4179; STANAG stands for "Standardization Agreement [NATO]"). This allowed not only ammunition to be interchangeable, but magazines too. It is basically the M16 rifle magazine and may be made of metal, polyurethane, or other suitable materials. There is no specified quality level. The STANAG is only a dimensional and magazine latch design requirement. They may be 20-, 30-, or 40-round box magazines or 90- and 100-round drum magazines and while the weapons they are used in may differ greatly in design, the magazines are interchangeable. Over the years as new weapon designs were fielded they were adapted to accept the "STANAG magazine." Some weapons have been modified to accept them. Some countries have not yet fielded weapons capable of accepting them. There are over 40 weapons (along with variants) that accept STANAG magazines. These include commercial designs for military and police sales and weapons made by non-NATO countries. There is a degree of dissatisfaction with the 5.56mm … rightfully. Efforts are being made to improve the existing round's performance and even increase its caliber, so long as the cartridge's overall length and case diameter does not change, rather than adopting another new round given the investment in STANAG magazines and the weapons that accept them.

Could US .45-caliber "GREASE GUNS" be converted to 9mm?

YES. The US$20 .45-caliber M3 submachine gun could be converted to 9mm for partisan use as the ammunition was plentiful in occupied Europe; French partisans used captured German ammunition, for example. Also, the British took much of the responsibility for supplying different partisan organizations and 9mm was also in their inventory. The conversion of the M3 to 9mm was accomplished by changing the barrel and bolt, and fitting feed adapters to 32-round British Sten gun magazines, which were flimsy compared to issue M3 magazines. These items were supplied in a kit allowing the weapon to be converted *prior* to being dropped to partisans along with a supply of British ammunition.

The Marlin .45-caliber M2 substitute standard submachine gun had this same capability, but they were never issued. The later M3A1 submachine gun could *not* be converted as it used an entirely different bolt and no 9mm capable bolt was made for it. (The M3, but not the M3A1, could not be fitted with a .45-caliber silencer and some were used by MACV-SOG reconnaissance teams in Vietnam.)

Interestingly, Nationalist China produced two copies of the M3A1; the .45-caliber Type 36 and the 9mm Type 37 in 1946 and 1947 respectively. The Type 37 was redesignated the Type 39 when it began to be produced on Formosa in 1950. Argentina produced a 9mm copy of the M3A1 in 1955, the PAM1 (*Pistola AMetralladora* – machine gun pistol), and later the PAM2 with an improved safety. These were not convertible weapons though.

The legendary THOMPSON SUBMACHINE GUN is one of the best known weapons. How widely used and how good was it?

The **"Tommy gun"** was developed by Brigadier General John T. Thompson[54] (1860–1940) of the US Army. He retired from the army in 1914 and for a short time worked for Remington and then returned to the army to serve throughout World War I. The Auto-Ordnance Company was established in 1916 and the principal designers of what would become the Thompson submachine gun were Theodore H. Eickhoff, George E. Goll, and Oscar V. Payne. Thompson's basic design was developed in conjunction with retired navy commander John Bell Blish (1860– 1921). Its design was rushed in order to offer a handheld, rifle-caliber light machine gun to the army during World War I. It was soon determined that a rifle-caliber weapon of sufficient compactness and light weight was not possible and the standard .45-caliber pistol round was selected. The goal was to provide a compact, handheld, short-range, close-quarters weapon suitable for trench warfare. The war ended before Annihilator I prototypes could be shipped to France for combat testing.

Development continued and in 1919 the new weapon was named the "Thompson Submachine Gun," the term being coined by the Auto-Ordnance board of directors. The armed forces and police only purchased

small numbers. Throughout the 1920s and 1930s the army was not open to such an unconventional weapon, foreign sales were very limited, and the police were not ready to sweep the streets with automatic weapons fire in the name of public order. However, some were purchased by the FBI, Postal Service, and a few big city police departments as criminals were using them. The Marines found it useful for jungle warfare and riot control during the Banana Wars, but again only small numbers were purchased.

Nevertheless, it was legal for civilians to purchase Thompsons, for $50, and this resulted in them being wielded by gangsters – by comparison a Chevrolet coupe cost $600. In order to purchase a full-automatic weapon a $200 transfer tax (Class 3 transfer) was imposed from 1934. (This tax is still levied and has never been increased.) Despite popular myth, probably more Tommy guns have been depicted in movies than were actually in the hands of gangsters and rumrunners. They were also used by police and constabulary in Central and South America and Irish-American supporters furnished some to the Irish Republican Army. The Coast Guard also used Thompsons to counter equally armed rum-runners. The Models 1921 and 1928 were marketed during this period.

Birmingham Small Arms in Britain attempted to develop a European-market, license-producing the Model 1923 in 7.65mm Parabellum and 9mm Parabellum, but garnered little interest. The Model 1926, chambered for the longer and more powerful .45 Remington-Thompson round, had a longer barrel, bipod, bayonet lug, and horizontal forearm and was offered as a lighter weight more compact replacement for the Browning Automatic Rifle. The army was not interested, especially in adding another cartridge to the inventory offering less effective range than the .30-caliber. The Model 1927 was marketed to civilians as the Thompson Semi-Automatic Carbine, which was based on the Model 1921.

FACT:
The “Tommy gun” was known by a number of different names, including:

anti-gangster gun
anti-bandit gun
Blotter

Chatterbox
Chicago banjo
chopper
coffee-grinder
mowing-machine
piano
gangster gun
grind-organ
pocket machine gun
riveter
room-cleaner
trench broom (said coined by Thompson)
typewriter
violin.

The "Tommy Gun" in use

The army finally standardized a modified Model 1928 as the M1928A1 T.S.M.G. in 1936, although it had purchased Model 1928s in 1932 as "non-essential special procurement." The M1928A1 was also used by the Marine Corps and Commonwealth forces. The Model 1928 used by the army and Commonwealth forces had a forward pistol grip, but the M1928A1 had a straight forearm, although those provided to the Commonwealth retained the forward pistol grip. Large numbers were provided to the Commonwealth through Lend-Lease from 1940 and remained standard until 1943 when replaced by their own Sten and Owen machine carbines. Thompsons were used in large numbers by Commandos and Paras and the Australians made good use of them in jungle combat on New Guinea. Many were also provided to the Nationalist Chinese and some to the USSR as on-vehicle equipment (OVE) aboard Lend-Lease M3 and M4 tanks and M5 halftracks. France purchased some just before the war. Sweden produced a copy of the M1928A1, the .45-caliber (11.4mm) *Kulsprutepistol m/40,* from 1940 to 1951. China also made a copy of the Model 1928 in the early-1930s and into World War II (designation unknown). The US Army and Marines adopted the improved M1 and M1A1 Thompsons in 1942 (the M1A1 had a fixed firing pin being the only difference). From late 1943 all Thompsons were supposed to be withdrawn and replaced by the M3 submachine gun

("grease gun" or "squirt gun"), but they were retained by many units. The withdrawn weapons would be issued to Allied forces, mainly the Chinese and Free French. The British Eighth Army in Italy retained Thompsons rather than using its own 9mm Sten gun. In late 1945 the selective-fire .30-caliber M2 carbine began to replace most submachine guns except those used as OVE aboard AFVs. M3A1 "grease guns" replaced Thompsons in this role. Some Thompsons were used during the Korean War and M1 and M1A1 Thompsons were issued to South Vietnamese forces in the 1960s.

The issue of Thompsons was actually limited within the US Army and Marines. In the army they were principally issued as OVE with one in each tank, halftrack, and tank recovery vehicle for self-defense. None were authorized for rifle companies, although occasionally some found their way into the hands of rifle troops. In 1944 rifle companies were authorized six submachine guns in a weapons pool rather than assigned to specific individuals, if approved by the theater commander. They were also issued to paratroopers and Rangers, but not on as wide a basis as is often assumed. Dismounted cavalry regiments fighting as infantry in the Pacific typically had one Thompson per squad. Only 50 Thompsons were authorized to each Marine division and these were held in a divisional pool. The Marines disliked the M1 carbine for frontline combat use by rifle platoons and often issued additional Thompsons or M1 rifles in their place.

SPECIFICATION:
Thompson submachine gun (Model 1928A1)

Cartridge: .45 ACP
Cyclical rate: 600–725rpm
Overall length: 33.75in (857mm)
Barrel length: Finned type, 10.5in (268mm)
Weight (empty): 10lb 12oz (4.8kg)
Muzzle velocity: 920ft/sec (280m/sec)
Sights: Lyman ladder read, blade front
Magazine: 20-round box

While a landmark and often popular weapon, the Thompson had its flaws. It was heavy; M1928A1 Thompson – 10.75lb (4.87kg), M1A1 Thompson – 10.45lb (4.74kg), and for comparison, M3A1 "grease gun" – 8lb (3.62kg), M2 carbine – 5.5lb (2.49kg) (weights are without magazines). They were also expensive, required close tolerances, and high-grade materials resulting in slow and costly production rates. It was a difficult weapon to assemble and disassemble correctly. In the Pacific it was found that it sounded similar to Japanese 6.5mm Nambu light machine guns and could draw friendly fire. The big, slow .45-caliber bullet achieved poor penetration through dense brush and bamboo to any depth. Nonetheless, it was still effective in jungle and forest combat at close ranges. One report describes it as "an ideal weapon for jungle warfare … In quick encounters with the enemy at short range, an alert submachine gunner can inflict heavy casualties before the enemy can open up with any substantial volume of fire." It would not penetrate the German steel helmet except at the closest range. It was found that in more open terrain requiring longer range its value dropped with a preference for the BAR. In street fighting though it was an excellent weapon for blasting off door locks and hinges and clearing rooms of unwanted occupants.

Another problem was its muzzle climb and muzzle blast. Early weapons were fitted with the Cutts compensator (invented by Marine Colonel Richard M. Cutts, Sr., 1878–1934, and his son, 1st Lieutenant Richard M. Cutts, Jr.), a device, of a somewhat different design, which proved more effective on shotguns to adjust their choke (bore diameter), reducing or expanding the shot spread, and to reduce recoil. On Thompsons it provided little muzzle climb reduction though and compensators were not installed on the M1 and M1A1. Even a long web strap attached to the muzzle and the looped end held by the firer's foot was tried in an unsuccessful effort to control muzzle rise. By comparison, modern post-World War II submachine guns are lighter, more compact, and generally lower costing than Thompsons, which had fallen from general use by the late 1950s.

However, most modern submachine guns owe their inception to the influence of the Thompson. Then there's the legend of the phantom mercenary, *Roland the Headless Thompson Gunner* (1978), but that's another story…

The .50-caliber machine gun has been around a long time. What versions were used?

In 1917 the need for such a weapon was first called to the attention of the Ordnance Department. While touring a French machine gun school Lieutenant Colonel John H. Parker was introduced to their Hotchkiss 11mm (11x59mmR Gras/Vickers – .445-caliber) Mle 1914 machine gun used as an aircraft gun (the US used this round in Vickers M1918 aircraft machine guns) as well as an experimental 12mm (.472-caliber) Hotchkiss anti-balloon gun.[55] He sent cartridges to the US Ordnance Department where it was decided that a larger caliber, higher velocity round was necessary. Winchester was working with John M. Browning and Colt on a scaled up .30-06 cartridge to use in an antiaircraft and antitank machine gun. This was a .50-caliber rimmed cartridge, but General Pershing fortunately requested that it would be more effective as an automatic weapon cartridge if rimless. The first .50-caliber cartridge did not have sufficient velocity and armor penetration. In the meantime German 13.2x92mmSR (.52-caliber) antitank rifle cartridges were obtained and it was found that these achieved higher velocity and better penetration. Modifications were made to the .50-caliber round in great secrecy as it was desired that it not be made public that German ammunition was recognized as superior to American.

Development of the .50-caliber cartridge was transferred to Frankford Arsenal. Colt produced six .50-caliber water-cooled Browning-designed machine guns in September 1918, less than two months before the Armistice. These were scaled up versions of the .30-caliber M1917 water-cooled machine gun. Even though the gun and its mount were heavy, it was difficult to control, and double spade-type grips were necessary to allow two-hand firing, a feature found on later .50-caliber models. This gun was never adopted by the army.

After the war .50-caliber machine gun development continued and took three tracks: as an air-cooled ground gun for antitank use and secondary antiaircraft use; as a water-cooled antiaircraft weapon; and as an aircraft gun. The .50-caliber water-cooled antiaircraft machine gun was adopted as the M1921, but did not enter production until 1929. It armed army and Marine antiaircraft units and was used as light antiaircraft armament aboard ships (this was before the adoption of the 20mm automatic cannon so

prodigiously mounted aboard ships in World War II). The gun was slightly improved in 1930 as the M1921A1. In 1933 the air-cooled machine gun was standardized in several versions, which can be confusing as all versions were designated M2. (There was an M1 [T2] .50-caliber, but it was never put into series production.) The most common "fifty" was the heavy barrel M2 (HB M2) used as a ground machine gun and mounted on AFVs and other vehicles, mainly as an antiaircraft weapon, but it was viewed as a secondary antitank and antipersonnel weapon at the time. By 1939 it was realized it was obsolete as an antitank weapon, but was well suited for many other purposes including suppressive fire. Besides vehicle mounts, the HB M2 could be mounted on an M3 tripod plus several models of ground antiaircraft mounts.

Fighter aircraft were fast improving in regards to armament and armor, and bombers needed more potent defensive armament than the standard .30-caliber AN-M2. Likewise fighters needed a more lethal weapon with improved penetration for attacking ground targets and chewing up enemy aircraft. Two versions of .50-caliber M2 aircraft machine guns were standardized in 1933. The M2 fixed machine gun lacked grips, was fired by a solenoid trigger, and capable of remote charging. They were mounted in wings, engine cowlings, cheek blisters, and powered turrets. The flexible M2 had standard spade grips and "butterfly" thumb triggers. They were mounted in waist firing ports, noses, aft cockpits, and open dorsal (top) and ventral (belly) positions to be freely traversed by the gunner – they were flexible. The aircraft guns had perforated air-cooling jackets and almost double the rate of fire of the exposed barrel HB M2.

Yet another version was the M2 water-cooled also adopted in 1933 to replace the M1921A1 (the M2 water-cooled had a longer barrel). These were used for both ground and shipboard antiaircraft, being replaced in the latter role by the 20mm Oerlikon automatic cannon in 1942.

Commonly known as the "fifty-cal" or "Ma Deuce" or simply the "Fifty," these weapons provided excellent service through World War II. The Vietnamese called it the "Number 50" or "M50" along the lines of the 7.62mm "M60" machine gun. At the end of the World War II the water-cooled versions were withdrawn as had most aircraft versions being replaced by new high rate of fire and larger caliber weapons, namely 20mm. The AN-M3, adopted at the end of the war, was still used in some aircraft including the early jet fighters and had a higher rate of fire than the M2

aircraft guns. The HB M2 soldiered on and it is still in service with only minor modifications over its 1933 ancestor. It was also used in multiple gun mounts such as the M55 quad machine gun mount used in Vietnam aboard 2½-ton and 5-ton convoy-escorting "gun trucks" (modified 2½-ton M35A1 and 5-ton M54A1 cargo trucks). The M55 was actually a trailer mounting with the two small wheels removed and fixed in the cargo bed.

The British call the flexible HB M2 .50-cal and the 12.7mm caliber gun the L2A1 and the L111A1 respectively a QCB (quick change barrel) plus have several tank-mounted versions used as ranging guns, the L1A1, L6A1, and L21A1. Before NATO standardization called for metric designations they referred to it as the 0.5in Browning. In Germany the gun is known as the MG50-1, Israel as the MAKACH (*Miklah KAliber CHamisheem* = machine gun caliber fifty), Denmark and Norway as the m/50, South Korea as the K6, Sweden as the Bofors-made Tksp 12,7 (*Tung kulspruta* = heavy machine gun), and Switzerland as the MG64.

From the 1970s numerous specialized versions of the .50-caliber have been introduced. The remotely fired M296 is a variant of the AN-M3 used on Army scout helicopters. The M213 is an upgraded HB M2 used on helicopter door mounts. The GAU-15/A (XM218) is a lightweight version of the M3 used on Air Force helicopters. The GAU-16/A is a slightly improved version. The GAU-18/A uses a lightweight barrel and is also mounted on Air Force helicopters. The Army's M3P, an outgrowth of the old AN-M3 aircraft gun, is used on Avenger air defense missile system vehicles (modified HMMWV – High Mobility Multipurpose Wheeled Vehicle) to augment its eight Stinger missiles. The GAU-21/A is a flexible Air Force version of the M3M (produced by FM in Belgium) and used on helicopters. A final version is the M2E50,[56] a commercially upgraded HB M2 with a QCB and other minor improvements, which can be applied in kit form. The US Navy and Coast Guard have used M2s on small craft from World War II to the present.

The US standardized two other .50-caliber machine guns. The M85 (T175E2) fixed machine gun was not a Browning design, but was developed by Aircraft Armaments, Inc. It was mounted in the commander's cupola on M60-series tanks, M728 combat engineer vehicles, and the Marine Corps' LVTP-7-series (redesignated AAVP-7 in 1982) amphibious assault vehicles from the early 1960s through the 1990s. It was lighter than the M2, had a shorter receiver to better fit inside the cramped commander's

cupola, and offered selectable high and low rates of fire for air and ground targets, respectively. The M85 required different non-NATO standard metallic links (M15A2) than Browning .50-caliber machine guns (M9 link). Studies indicated the M85 was unreliable and complex even though many users were pleased with it. Regardless, it was phased out being replaced by the old reliable HB M2. Another non-Browning "fifty" is the General Electric GAU-19/A (aka GECAL 50 – pronounced "gee-cal fifty"), a three-barrel, selectable 1,000 or 2,000 rounds per minute electrically-operated rotary gun mounted on some army helicopters.

The Browning "fifty-cal" is a highly regarded weapon which has been used and is being used by scores of countries and license-produced in several. It is expected to remain in the US inventory for some time and there is little doubt that it will still be in service somewhere to celebrate its 100th anniversary.

The "fifty's" lighter pending replacement, the XM307 Objective Crew Served Weapon (OCSW), is under development. This is a 25x59mm automatic weapon which may also replace the 40mm Mk 19 Mod 3 automatic grenade launcher. The XM307 has a quick-change barrel and bolt capability allowing it to fire the old reliable and very useful .50-caliber ammunition. The 25mm round is a "smart" projectile integrated with a gun-mounted laser targeting system to allow it to achieve airburst over targets behind frontal cover. The laser rangefinder not only determines the target's range, but will "tell" the project at what range to burst over the target. Development of this complex system is ongoing. To field a replacement for the Browning .50-caliber sooner, the XM312 Common Close Support Weapon (CCSW) was developed. This is simply the XM307 with a .50-caliber barrel and lacking the laser-targeting capability. It likewise can be converted to 25mm by changing the barrel and just four other parts. In the future, once the laser-targeting system is perfected, the XM312 can be upgraded to the XM307. However, the XM312's low rate of fire (under 300 rounds per minute) has precluded its adoption by the army. The XM307 was cancelled in 2007. A new search for the M2's replacement began in 2008 under the Lightweight .50-caliber Machine Gun Program (LW50MG). The XM806 is being developed by General Dynamics, the designer of the failed XM312 and it is a spin-off of that weapon. It was supposed to be ready in 2012, but it too suffers from the same low rate of fire as the XM312 and was not adopted.

The 105mm HOWITZER used in Vietnam was said to have been used in World War II. However, in World War II the standard 105mm was the M2A1 and in Vietnam it was the M101A1. How can this claim be correct?

There is a simple answer: both "one-oh-fives" were the same weapon.

During World War II weapons were assigned model designations by caliber and type. There were 81mm mortars, 90mm antiaircraft guns, 155mm howitzers, 155mm guns, 8in howitzers, 8in guns, and 240mm howitzers all designated "M1," along with many other types of weapons.

The same applied to the 105mm howitzer, which began replacing the 75mm M1897-series gun at the beginning of World War II. (These "French 75s" were not really that old. Some were produced during World War I and into the 1930s and had since been modernized.) The 105mm M1 howitzer had been standardized in 1928 as a horse-drawn piece. Other than 14 prototypes, none were built, but they were kept on standby for wartime production if needed. These were modified for trank towing in 1939 as the M1A1. Design improvements made it the 105mm M2 howitzer, which was standardized in 1939, but again, it did not enter series production with just 48 built. The M2A1, with minor design changes, was standardized in 1940 and entered production to become the main US divisional artillery piece for the next 40-plus years. (There was also a lightweight, short-barreled 105mm M3 howitzer – "snub-nose 105" – seeing specialized use during the war with glider field artillery battalions and in some infantry regiment cannon companies.) There was also an M2A2 in 1943 with a larger shield and redesigned traversing mechanism, but this was never fielded. "M105" is occasionally seen for World War II 105mm M2A1 howitzers, but is of course incorrect.

The 105mm M2A1 remained the standard light artillery piece through the Korean War and beyond. The excellent piece also saw use by many other country's armies. Army Chief of Staff General George C. Marshall (1880–1959) credited the "one-oh-five" as being one of the key weapons contributing to winning World War II.

A new series of artillery pieces was being developed in the late 1950s and early 1960s and during this time the Ordnance Department changed its

weapon designation practices. Instead of each caliber and type of weapon commencing with "M1" and progressing through M2, M3, and so on, all Ordnance Department-developed artillery pieces were assigned a sequential model number regardless of caliber and type. This resulted in existing weapons selected to remain in the inventory being redesignated with new model numbers beginning with M101. As a result, some World War II weapons, which really did not need improvement and were remaining in the inventory, received the following new designations in 1962:

Old designation	**New designation**
75mm M1A1 pack howitzer	M116 [1]
105mm M2A1 towed howitzer	M101A1
155mm M1A1 towed howitzer	M114A1
8in M1 towed howitzer	M115
155mm M1A1 towed gun	M59 [2]

1. Weapons deemed unsuited for firing full-charge cartridges were designated the 75mm M120 salute howitzer and were modified to prevent them from chambering rounds with projectiles.
2. This redesignation predated 1962 owing to earlier post-war modifications. It was not redesignated in the new series as it was scheduled to be phased out with the pending introduction of the 175mm M107 self-propelled gun.

In 1964 the new lightweight 105mm M102 (T164) howitzer began to replace the M101A1, although the latter remained in use for quite some time.[57] The M102 began to be replaced by the 105mm M119 howitzer, a modified version of the British L119, at the end of 1989. An improved version, the M119A1, was fielded between 1991 and 1995, and the M119A2 in 2008. A new even lighter weight 105mm howitzer is being sought with several contenders making offers. The lightweight 155mm M777A1 howitzer (aka LW155), a much modified British design, was

standardized by the US Army and Marine Corps in 1997 and low rate production commenced in 2002. The M777A1 began replacing the 155mm M198 howitzer (introduced in 1979) in 2005 in the Marines and 2006 in the army. The M777A2, capable of firing the M982 Excalibur precision-guided, extended-range projectile (over 24 miles; 40-plus km), was standardized in 2007 and A1's were upgraded.

Does the "IT WASN'T INVENTED HERE SYNDROME" still apply?

It used to be said that no foreign weapon, no matter how good, was ever adopted by the US Army or Marine Corps – the infamous "it wasn't invented here syndrome." It was especially prevalent in the 1950s and 1960s. That syndrome fortunately has largely died with the effort to reduce research, development, and procurement costs, introduce NATO standardization, and the recognition that there are many good ideas developed across the seas. Additionally, it is a two-way street, for example, when the US adopted the Belgium 7.62mm MAG as the M240 coaxial machine gun to replace the US-designed, problem-riddled 7.62mm M73 and M219 tank machine guns, Belgium agreed to purchase American General Dynamics F-16 Fighting Falcon fighters. Some of these listed weapons/equipment were derived from a foreign model, usually by the company that produced the original model, and are not always exactly the same weapon/equipment as the original. There is one foreign weapon though that US servicemen have frequently called for, but has been rejected since Vietnam to Iraq, the Soviet-designed RPG-7 antitank projector. The US Ordnance Corps will never adopt this weapon nor admit to its effectiveness by proposing its standardization.

What US Army and Marine Corps weapons and equipment today are produced under license, copied, based on foreign designs, or purchased directly from foreign countries?[58]

US weapon/equipment	Foreign weapon/equipment	Origin
9mm M9 & M9A1	9mm Beretta Model	Italy

pistols	92FS pistol	
9mm M11 compact pistol	9mm SIG-Sauer P228 pistol	Switzerland
9mm Mk 25 Mod 0 pistol	9mm SIG-Sauer P226 pistol	Switzerland
9mm MP5-series submachine guns[x] (Main models in US use were MP5N, MP5KA4, & MPSD3.)	9mm H&K MP5-series machine pistols	Germany
5.56mm XM8 carbine (project cancelled)	5.56mm H&K G36 assault rifle	Germany
5.56mm M27 infantry automatic rifle	5.56mm H&K HK416 assault rifle	Germany
5.56mm HK416 carbine	5.56mm H&K HK416 assault	Germany
	rifle	
5.56mm M249 SAW & variants (SPW, Mk 46)	5.56mm FN Minimi light machine gun	Belgium
5.56mm Mk 16 Mod 0 rifle[x]	5.56mm FN SOF Combat Assault Rifle	Belgium
7.62mm Mk 17 Mod 0 rifle[x]	7.62mm FN SOF Combat Assault Rifle	Belgium
7.62mm M240-series machine guns[1]	7.62mm FN MAG 58 machine guns	Belgium
.45-cal Mk 23 Mod 0	.45-cal H&K USP45	Germany

offensive handgun	universal self-loading pistol	
.45-cal Mk 24 Mod 0 pistol	.45-cal H&K HK45C pistol	Germany
.50-cal M3P air defense machine gun (Avenger)[x]	12.7mm FN-Browning M3P machine gun	Belgian-made
.50-cal GAU-21/A aircraft machine gun[x]	12.7mm FN-Browning M3M machine gun	US-designed
12-ga M1014 joint service combat shotgun[x]	12-ga Benelli M4 Super 90 shotgun	Italy/Germany
14.5mm M31 field artillery subcaliber trainer	14.5mm L1A1 field artillery trainer	Britain
9mm M287 subcaliber tracer trainer (for M136 LAW)	Saab AT4 subcaliber tracer trainer	Sweden
9mm Mk 8 Mod 0 spotting rifle[2]	9mm LAW 80 spotting rifle	Britain
40mm M320 grenade launcher module	40mm AG36 enhanced grenade launching module	Germany
40mm Mk 13 Mod 0 grenade launcher [x]	40mm FN40GL enhanced grenade launching module	Belgium
40mm M32 multiple grenade launcher	40mm Milkor MGL-140 grenade launcher	South Africa

M136 LAW ("AT4")	84mm Bofors AT4 antitank projector	Sweden
AT4C anti-bunker weapon[x]	84mm Bofors AT4C anti-bunker projector	Sweden
MGM-21A wire-guided antitank missile[x] (SS-10)	Nord SS.10 *téléguidé antichar*	France
MGM-22A wire-guided antitank missile[x] (SS-11)	Nord SS.11 *téléguidé antichar*	France
MGM-32A wire-guided antitank missilex (ENTAC)	Nord *engin téléguidé antichar*	France
83mm Mk 153 Mod 0/1 SMAW[3]	82mm B-300 antiarmor rocket launcher	Israel
84mm M3 MAAWS[x4]	84mm Carl Gustav M3 (m/86) recoilless rifle	Sweden
81mm M252 medium extended-range mortar	81mm L16A2 mortar	Britain
105mm M119, M119A1, & M119A2 howitzers	105mm L119 howitzer	Britain
105mm M68 tank gun (M1, M60A3, M48A5 tanks; Stryker M1128 mobile gun system)	105mm L7A1 tank gun	Britain

105mm XM35 gun (M8 armored gun system)	105mm Rheinmetall low-recoil gun	Germany
120mm M256 tank gun (M1A1, M1A2 tanks)	120mm L/44 Rheinmetall tank cannon	Germany
120mm M120 & M121 battalion mortar system	120mm Soltam K6 mortar	Israel
120mm XM326 Dragonfire automated mortar	120mm Thomson Daimler 2R2M mortar	France
155mm M777A1 & M777A2 howitzers	155mm UFH ultralightweight field howitzer	Britain
165mm M135 demolition gun (M728 CEV-obsolete)	165mm L9A1 demolition gun	Britain
Light armored vehicle (LAV)-series	MOWAG Piranha armored vehicle	Swedish-designed, Canadian-made
Stryker combat vehicle-series	General Motors of Canada LAV III	Canada
M93 & M93A1 Fox NBC recon vehicles[x]	TPZ1 *Fuchs* NBC recon vehicle	Germany
RG-33 & RG-33L mine resistant ambush protected vehicles	RG-31 *Nyala* APC	South Africa
M973 small unit support vehicle[x]	Bv 206 articulated all-terrain carrier	Sweden

Small emplacement excavator (SEE) & high-mobility material handler (HMMH) [x]	Unimog U 900 vehicle chassis	Germany
Standard float bridge (aka ribbon bridge/raft)	PMP heavy folding pontoon bridge (possibly copied from German protoype)	USSR
Improved float bridge (aka improved ribbon bridge)	Improved folding float bridge	Germany
AN/PPS-12 mine detector	Schiebel AN-19/2 mine detector	Austria
APOBS antipersonnel obstacle-breaching system	POMINS portable mine neutralization system	Israel
M15 antitank mine	*Tellermine 42* (platter mine 1942)	Germany
M16-series antipersonnel	*Schrapnellmine 44* (shrapnel	Germany
mines	mine 1944)	
M16-series antipersonnel mines	*Schrapnellmine 44* (shrapnel mine 1944)	Germany
L8A1 & L8A3 red phosphorus smoke grenades[x]	L8A1/A3 red phosphorus smoke grenades	Britain
M28 HEAT & M29 TP rifle grenades (obsolete)	Mecar Energa 75 HEAT & practice rifle grenades	Belgium

5.56mm M855 ball cartridge	5.56x45mm SS109 ball cartridge	Belgium
9mm pistol & submachine gun cartridges	9x19mm Parabellum cartridge	Germany
.50-cal Mk 211 Mod 0 API cartridge	12.7x99mm NM140 multipurpose cartridge	Norway

1. Only six other countries have made wide use of the M60: Australia, El Salvador, the Philippines, South Korea, South Vietnam, and Thailand. The MAG is practically a worldwide standard general-purpose machine gun being used by at least 57 countries.
2. Mounted on the Marine Corps' 83mm Mk 153 Mod 0/1 SMAW.
3. The SMAW was *derived* from the B-300 and is not a copy. Both were developed by the same US firm.
4. Multi-role, Antipersonnel, Antiarmor Weapons System (MAAWS). When adopted in 1990 it was originally called the Ranger Antiarmor/Assault Weapon System (RAAWS), which the Rangers still refer to it as.

Additionally, during the Vietnam War US Special Forces and MACV-SOG used some foreign weapons procured through the CIA for covert operations. These included the Swedish 9mm Carl Gustav m/45b and m/45S (silenced) submachine guns ("Swedish-K"), Danish 9mm Madsen m/50 submachine gun, Israeli 9mm Uzi submachine gun (silenced), British 9mm Mk IIS (silenced) machine carbine, and Belgium 9mm Browning Hi-Power pistol.

The use of foreign weapons predates the 1960s, albeit in comparatively limited numbers. The following list includes foreign origin weapons that were used by the US in World War II, some dating from World War I, either copied, license-built, or obtained through "reverse Lend-Lease":

US weapon/equipment	**Foreign weapon/equipment**	**Origin**

.30-cal M1903-series rifles (Springfield)	7.9mm Mauser Gew.98 rifle	German
.30-cal M1917 rifle (Enfield)	.303-in No. 3 Mk I rifle (aka P' 14)	Britain
.30-cal T24 machine gun (cancelled test project)	7.9mm MG.42 machine gun	Germany
.303 Mk I heavy machine gun	.303-inch Vickers Mk 1 machine gun	Britain
.30-cal M1909 automatic machine rifle	8mm Mle 1909 Benét-Mercié machine gun	France
8mm M1914 heavy machine gun	8mm Hotchkiss Mle 1914 machine gun	France
8mm M1915 & .30-cal M1917 light machine guns	8mm Chauchant Mle 1915 machine gun	France
.55-cal Mk 1 antitank rifle[x]	0.55inch Boys Mk 1* antitank rifle	British-designed, Canadian-made
.60-cal T17-series aircraft machine guns	15mm MG.151 aircraft machine gun	Germany
2-inch M3 mortar[x] (tank-mounted)	2-inch Mk I* smoke bomb thrower	Britain
37mm M1916 infantry &various subcaliber guns	37mm Mle 1916 infantry cannon	France
37mm M3 & M3A1	3.7cm Pak.35/36 armor	Germany

antitank & M5 & M6 tank guns	defense gun	
57mm M1 antitank gun	6-pdr Mk 2 antitank gun on Mk 2 carriage	Britain
57mm Mk 4 airborne antitank gun[x]	6-pdr Mk 4 antitank gun on Mk 3 airborne carriage	British
75mm M1897-series field & antitank guns	75mm Mle 1897 cannon (halftrack-mounted) (“French 75”)	France
60mm M2 & M19 mortars	60mm Mle 1935 mortar	France
81mm M1 mortar	81mm Mle 1931 mortar	France
155mm M1918 howitzer	155mm Schneider C Mle 1917 cannon	France
155mm M1918 M1 gun	155mm G.P.F. Mle 1917 cannon	France
155mm M1A1 gun	155mm G.P.F. Mle 1917 cannon	France
8-inch M1 howitzer	8in Mk VII howitzer	Britain
20mm AN-M1, AN-M2, M3, & Mk 16 aircraft guns	20mm Hispano-Suiza Type 404 aircraft gun	Switzerland
20mm Mk 2 & Mk 4 antiaircraft guns	20mm Oerlikon Type SS antiaircraft gun	Switzerland
40mm M1 & Mk I-III antiaircraft guns	40mm Bofors m/37 antiaircraft gun	Sweden
12,000lb M123	12,000lb Tallboy medium-	Britain

general-purpose bomb	capacity bomb	
22,000lb M110 general-purpose bomb	22,000lb Grand Slam medium-capacity bomb	Britain
M83 antipersonnel bomblet	*Sprengbombe Dickwandig 2kg (SD2)* (WWII)	Germany
	(high-explosive bomb, thick-walled 2kg)	
M9 HEAT rifle grenade	Gewehrgranate zur Panzerbekämpfung 40	Germany
	(rifle grenade for antiarmor combat	
	1940)	
M1 bangalore torpedo	Mk 1 sectionalized bangalore torpedo	Britain
M7 light antitank mine-grenade	No. 75 Mk 1 antitank mine-grenade	Britain
AN-M75 red two-star distress signal	Mk 1 red two-star distress signal	Britain

* The asterisk (*) appended to British weapon designations identified a minor modification and was called a “star.”

When the American Expeditionary Force began arriving in France in 1917 a great deal of its weaponry and equipment was provided by the French and British. This included rifles, machine guns, grenades, mortars, artillery, tanks, aircraft, and even horse-drawn wagons. The US was rapidly developing and producing indigenous weapons or licensed copies of British and French weapons, but very few of these reached the AEF before the Armistice. It is often assumed that American troops were armed with

mostly US-production weapons, but the reality was that they were largely equipped with foreign weapons and ordnance and only began to receive what few US-production arms were ready in the final weeks of the war with most units receiving none. The US was at war from April 1917 to November 1918 – 19 months in total – and troops were engaged in combat for only 12 months.

Were SHOTGUN SHELLS fired in early military rifles

There were two very different circumstances in which **.410 shotgun shells** have been fired in military rifles. This was a common practice with the .45-70 "trap door" Springfield M1873 rifles and carbines, M1877 carbines, and M1888 rifles. The 2in (50mm) and 2½in (65mm) .410 cartridges chamber in .45-70 weapons. The 3in (75mm) long .410 should not be fired in the trap door Springfield owing to higher chamber pressure. The 2½in .410 chamber pressure is within the limits of the trap door Springfield, which, however, is not noted for its strength. This writer does not recommend it with these antique weapons, but it was a common practice for hunting rabbits, squirrels, and birds back in the day.

Prior to World War II the British modified Lee Enfield .303in rifles, mostly the No. 1 Mk III SMLE, at the Ishapore Arsenal in India. They functioned well in the single-shot mode; a wooden block being inserted in the magazine. Attempts were made to modify the magazine to provide a repeating shotgun for riot control, but these efforts were unsuccessful. They were more widely used for guard duty and bird hunting. The SMLE barrel was bored out to .410in and the 2in long brass cartridges were made from blown out .303in cases reloaded with shot and closure wads. Regular .410 shotgun shells could not be used.

There is a commercial revolver that fires .410 shells. The Judge .45/410, made by Taurus, is a five-shot revolver with a much lengthened cylinder capable of firing 2½in long .410 shotshells, .45 Colt, and .45 Schofield rounds. Cartridges of all three calibers can be loaded in any mix. This unusual revolver is intended for close-range self-defense and survival situations. The National Firearms Act of 1934 restricts shotguns from having a smoothbore barrel length less than 18in. The Judge has a 3in *rifled* barrel making it legal. The rifled barrel imparts a spin on the shot column

causing it to spread in a slightly wider pattern at closer ranges than smoothbore shotguns.

What SURVIVAL RIFLES were used in Air Force survival kits?

During World War II it was recognized that there was a requirement for a survival rifle or shotgun or a combination weapon to be included in aircraft survival kits, especially those operating in far northern and arctic regions. Small game was about the only food source in such sparsely populated regions and survivors often had to subsist for long periods before rescue or had to walk out on their own. While the small-caliber rounds used against varmints would have been more effective if hollow or soft point, to comply with the Hague Convention in the event that they were used against enemy combatants, solid lead or full metal jacketed bullets were issued.[59] These weapons were issued only as a component of large survival kits carried in bombers and transports, not one- or two-man crewed aircraft; they had to rely on their handguns.

The first purpose-built survival weapon was the **Stevens No. 22/410** break-open, over-and-under shotgun/rifle in early 1944. It was chambered for .410 3in magnum with No. 7½ birdshot (0.095in) and .22 Long Rifle. It had a normal wooden stock with a 24in barrel and was not considered sufficiently compact. Prior to this, the standard .30-caliber M1 and M1A1 (folding stock) carbines were used as an interim solution. The M4, M6, and MA-1 shown here all had 14in barrels, which were under the legal 16in length for civilian rifles.

To replace the inadequate Stevens, in 1951 the Air Force developed the **M6 (T39)** folding (hinged at the pin forward of the trigger guard), over-and-under survival shotgun/rifle; the "aircrew survival weapon." The upper barrel was chambered for the .22 Hornet M65 (5.6x35mmR) and the lower for .410 2½in M35 shot shells with No. 6 (0.11in) birdshot. Nine .22 Hornet and four .410 rounds were carried in the metal stock; more ammunition was provided in the kit. They are sold commercially as the Springfield Scout with a legal 18in barrel. Besides the .22 Hornet, designed as a civilian

varmint cartridge, the Scout is chambered for .22 Long Rifle and .22 Winchester Magnum.

There was also a Harrison & Richardson-designed **M4 (T38)** takedown, telescoping wire stock, bolt-action survival rifle chambered for the .22 Hornet. It used a five-round magazine. ArmaLite developed the AR-5A, which was adopted by the Air Force in 1957 as the **MA-1**. This was an extremely light .22 Hornet bolt-action, takedown rifle. The barrel and receiver, with a four-round magazine, were stowed inside the fiberglass stock with its butt plate serving as a lid (16in [40.6cm] long; 2.5lb [1.14kg]); it was floatable. The Air Force cancelled its adoption and retained the M4 and M6.

A couple of years later a similar weapon in breakdown concept was developed by ArmaLite for the civilian market. The .22 Long Rifle AR-7 Explorer was semiautomatic with a 16in barrel, and used 8-, 10-, and 15-round magazines. It was made over the years by other firms: Charter Arms, Survival Arms, Henry Repeating Arms, and AR-7 Industries. A much modified version was used by the Israeli Air Force.

By the 1980s the Air Force ceased issuing survival shotguns and rifles. Studies showed there were extremely limited opportunities to use them. They now rely on 9mm M9 pistols, mainly a self-defense weapon and it and its ball ammunition are ill-suited for survival hunting. With modern high-endurance, long-range helicopters, compact emergency radios with GPS locating capabilities, and efficient air-rescue services, most surviving aircrew are quickly rescued if they're not captured soon after being downed.

Which weapons were used in successful and near-successful US ASSASSINATIONS?

The firearms chosen by assassins and would-be assassins to kill presidents, other political notables, or significant public figures were of varied quality (local-level politician assassinations and celebrity murders are not addressed here). Eight governors, seven US senators, nine US congressmen, 11 mayors, 17 state legislators, and 12 judges have been attacked over the years.

None of the weapons of choice even begin to approach the high-tech killing-machine marvels depicted in recent action movies. Many of the arms used were actually poor choices, even if they may have killed the intended victim, and were effective only due to the extremely close range or to luck. It certainly was not the skill of the shooters, most of whom were not known for their shooting abilities or any realistic preparation on their part. In fact, those that are considered some of the poorer weapons were the most effective, demonstrating the variables of bullet effects and chance. Two used .22 Long Rifle revolvers and three .32-caliber handguns; not exactly what would be considered assassination weapons of choice. However, the use of these inadequate handguns resulted in three deaths (two being the intended victims) and wounded 12 bystanders (including one of the intended victims). Two intended victims of these low-power weapons were not hit.

With the exception of the President Truman attempt and the Malcolm X and Representative Ryan assassinations, the assassins were lone gunmen, irrespective of broader unproved conspiracy theories regarding other assassations. The President Lincoln assassination was the one example of a proven true conspiracy involving multiple players and multiple targets, but each assassin worked alone. Unlike movies, there's seldom a conspiracy in real life. The extreme conspiracy theories that inevitably emerge after assassinations and attempts have no bearing on this discussion.

It is seldom that the complete designation and model of weapons used in these events are found. We have made an effort to provide this information. Of the 22 assassinations or attempts discussed here, rifles with telescopes were used only three times, a lever-action rifle and semiautomatic carbine once apiece, nine used revolvers (of which four were snub-nosed – 2.5in or shorter barrel), nine semiautomatic pistols were used, and three used cap-and-ball handguns. Nine of the weapons were foreign-made. One assassination involved a sawed-off double-barrel shotgun and two semiautomatic pistols. One attempt used a hand grenade. The numbers and types of weapons used in the Jonestown assassination/mass murder of Representative Ryan were inadequately identified so were not included in the foregoing breakdown.

Most of the handgun attacks were conducted from pointblank to 10ft (3m) ranges. The attempt on Franklin Roosevelt was from 30ft (9m) and the second attempt on President Ford was from 40ft (12m). The two "long-

range" sniper attacks (Kennedy and King) were undertaken with telescope-equipped rifles at ranges between 175 and 265ft (53 and 81m), not even 100 yards. The carbine spray-fire White House attack was from 230ft (70m) and the inept drive-by shooting at the White House was from 660yd (600m).

Nine of the assassinations or attempts resulted in bystanders being shot, usually more than one. Only two would-be assassins were killed and two wounded during the attacks. All others were arrested immediately, being wrestled to the ground, or soon afterwards, uninjured, except Lincoln's assassin who was shot and killed during his attempted apprehension 11 days later and the White House drive-by shooter who was captured five days later. Martin Luther King's assassin was arrested two months later in London.

Of the 22 assassinations or attempts examined here, only in three instances was fire returned by the target's security personnel, if there were any present. In most cases in which the assassins were apprehended at the scene they were wrestled to the ground and pinned by security personnel and/or civilian bystanders.

President Andrew Jackson (1767–1845) Washington, DC; shot at twice resulting in two misfires on January 30, 1835 and emerged unharmed. (Jackson is reputed to have been involved in over 100 duels and was wounded several times. It was said he rattled when he walked. Research, however, has found he was in only 14 duels, killed only one man, and was wounded three times in combat and duels.)

Deranged, would-be assassin Richard Lawrence (1800–61) fired two small muzzle-loading, cap-and-ball pistols, one from within 13ft (4m) and the second from pointblank range – sources are in disagreement of the ranges, of which both misfired with only the percussion caps igniting. Research has not uncovered the caliber and make of the pistols. Lawrence was subsequently subdued by Jackson whaling his cane and aided by bystanders, including Congressman Davy Crockett (1786–1836). The odds of both pistols misfiring are said to be 1 to 125,000. They were test fired in the 1930s and both functioned. However, the odds were actually lower when it is considered that the make of pistols are said to have been vulnerable to moisture and the weather that day was extremely humid and possibly the cold affected the pistols (the actual January temperature is not known).

President Abraham Lincoln (1809–65) Washington, DC; shot once at pointblank range in the back of his head on April 14, 1865 and died April 15.

Assassin John Wilkes Booth (1838–65) fired one shot from a .44-caliber Deringer (no model or serial number) cap-and-ball pocket pistol.[60] He was also armed with a 7¼in blade hunting knife (often misreported as a "Bowie knife" with differing blade lengths, usually longer) intended for General-in-Chief Ulysses S. Grant (1822–85), who was absent; instead an army officer was slightly wounded with the knife. (One of Lincoln's last official acts was to establish the Secret Service, mainly for anti-counterfeiting purposes, but from 1894 it would also guard the US President.) Perhaps a score of innocent men throughout the East were lynched or shot in belief they were the fugitive Booth. Others were murdered because they expressed gratification with Lincoln's death. Ironically, John Wilkes Booth can be seen standing near Lincoln in an 1861 inauguration photograph.

Secretary of State William H. Seward, Sr. (1801–72) Washington, DC; was slashed multiple times on the face and neck with a knife on April 14, 1865, at the same time Lincoln was assassinated. Seward recovered and is known for the purchase of Alaska two years later.

Would-be assassin Lewis T. Powell (aka Lewis Paine or Payne, 1844–65), in league with the Lincoln conspirators, forced his way into Seward's home, attempted to shoot Seward's son at pointblank range with a .36-caliber Whitney Navy Model cap-and-ball revolver (six-round), which misfired. He pistol-whipped the son, made his way to the third floor, and attacked the bedridden Seward with a 9in blade Bowie knife inflicting several serious wounds. One slash penetrated his right cheek. A jaw splint deflected the knife away from his jugular vein. (Seward was recovering from multiple serious injuries received in a recent carriage accident.) Powell wounded three others in the house with the knife while escaping. He was captured three days later. Fellow conspirator David E. Herold (1842–65) had guided Powell to Seward's home, but fled when hearing the commotion inside. He was later captured with John Wilkes Booth. Seward's wife is said to have died the following June from the stress of almost losing her husband. Powell had served as a Confederate infantryman, was captured, escaped, joined the Confederate cavalry, and then did limited secret service work. He could be considered the only "professional" among

the Lincoln conspirators and probably the only professional among all the assassins studied here.

President James A. Garfield (1831–81) Washington, DC; shot once in the chest (a second bullet grazed his sleeve) on July 2, 1881 and died September 19 of heart attack, pneumonia, and blood poisoning caused by unsanitary attempts to remove the bullet. (Garfield was the first president to speak on a telephone, his first words being, "Please speak a little more slowly" to Alexander Graham Bell, who later attempted to locate the bullet in Garfield's body with an electric metal detector.)

Assassin Charles J. Guiteau (1841–82) fired twice with a British .44 Webley & Scott Bulldog snub-nosed revolver (six-round) at pointblank range. Guiteau later claimed he had not killed Garfield, but the president's bungling doctors did.

FACT:
Robert T. Lincoln (1843–1926, President Lincoln's eldest son) is the only man known to have witnessed the assassinations of three presidents, his father, James Garfield, and William McKinley. After seeing McKinley assassinated he vowed he would never again appear in public with an incumbent president.

Governor of Kentucky William J. Goebel (1856–1900) Louisville, Kentucky; shot once through the chest on January 30, 1900, election day, and died February 3 after being sworn in on his death bed. He is the only serving US governor to be assassinated.

Accounts are convoluted and conflicting with five or six shots fired from a .38-55 Winchester & Ballard Marlin Model 1893 lever-action rifle from a nearby building (range not provided, but fewer than 100ft [30.5m]). Sixteen people, including the opposing gubernatorial candidate and the secretary of state, were eventually indicted, a rare instance of an actual conspiracy. It almost resulted in a state civil war. There were multiple trials and retrials with many suspects acquitted or turned state's evidence. Henry Youtsey (1873–1942) was convicted and sentenced to life for the murder. Later Jim

Howard was also convicted, but it has never been determined for certain who the actual assassin was.

President William McKinley, Jr. (1843–1901) Buffalo, NY; shot in the stomach with another shot grazing his shoulder on September 5, 1901 and died September 14. (He was the first president to ride in a self-propelled vehicle, the electric ambulance carrying him to the hospital that fateful day.)

Assassin Leon Frank Czolgosz (1873–1901) fired two shots from a .32 S&W Iver Johnson Safety Automatic Hammerless revolver[61] (six-round) at pointblank range. This assassination resulted in the Secret Service supplying round-the-clock bodyguards to presidents from 1902. From 1894 the Secret Service had provided only part-time security.

Presidential candidate Theodore Roosevelt, Jr. (1858–1919) Milwaukee, WI; shot once and wounded on October 14, 1912. The bullet was slowed by his eyeglasses case and his folded 50-page speech papers. With the bullet lodged 3in in his chest he declined attention and delivered the 90-minute speech first announcing, "Ladies and gentlemen, I don't know whether you fully understand that I have just been shot; but it takes more than that to kill a Bull Moose."[62] Blood seeped through his shirt during the speech.

Would-be assassin John F. Schrank (1876-1943) fired one shot with a .38 S&W Colt Police Positive Special revolver (six-round) from 6ft (2m). (This was Roosevelt's second presidential bid, which he lost – no sympathy vote was forthcoming.)

FACT:
T.R., by the way, an avid hunter, was the source of the name "Teddy Bear" as he had refused to shoot an old bear tied to a tree so he could have a "successful" hunt.

President-elect Franklin D. Roosevelt (1882–1945) Miami, FL; while standing on an automobile running board was shot at once on February 15, 1933 but was unharmed.

Would-be assassin Giuseppe Zangara (1900–33) fired one shot from a .32 S&W US Revolver Company[63] revolver (five-round) from 30ft (9m). He

missed the President-elect, but while being wrestled to the ground fired four wild shots. Five bystanders were struck including Chicago Mayor Anton J. Cermak (1873–1933), who was hit in the chest. Cermak died on March 6. One other bystander also died. It was theorized that Cermak was the actual target rather than Roosevelt, but Zangara insisted his target was the President-elect.

Senator and former Governor of Louisiana Huey P. Long, Jr. (1893–1935) Baton Rouge, LA; shot twice on September 8, 1935 and died September 10. He was hit by a .38-caliber and a .45-caliber bullet in the abdomen (or two .38s; one passed through and it was uncertain if the correct bullet was recovered or some other combination and caliber of bullets). Reference sources are in serious conflict and contradictory in virtually all aspects of the shooting.

Prospective assassin Dr Carl A. Weiss (1906–35) was alleged to have fired twice with a Belgium .32 ACP FN-Browning Model 1910 pistol (seven-round). Three bystanders were wounded when Long's Highway Patrol bodyguards opened fire. Accounts vary greatly and the investigation was extremely shoddy. Weiss was armed with a .32-caliber pistol from which two rounds were fired (an expended case was jammed in the ejection port), but the bullets were never found in Long or elsewhere. The several bodyguards used various makes of .38, .44, and .45-caliber handguns, which killed Weiss with 32 hits (some sources claim up to 60 hits). Two of these shots struck Long, possibly ricochets, bullets that passed through Weiss, or simply misses. Weiss can be said to have failed in his attempt, but achieved his goal.

President Harry Truman (1884–1972) Washington, DC; Truman was not directly shot at during the bungled November 1, 1950 attempt.

Would-be assassins Griselio Torresola (1925–50) and Oscar Collazo (1914–94) attempted to storm the Blair House where Truman was residing while the White House was undergoing renovation. Torresola fired a large number of shots (reloading once) from a German 9mm Luger P.08 pistol (eight-round) and Collazo fired several rounds from a German 9mm Walther P.38 pistol (eight-round) together wounding three White House policemen, one who later died having been hit three times (Private Leslie

Coffelt); the other two were hit one and three times. The number of shots fired by each of the two Puerto Rican nationalists is not reported, but they fired 27 shots between them at 30–40ft (9–12m) ranges. Torresola was killed by the mortally wounded officer who shot him in the head and Collazo was wounded, being hit three times in the head, right arm, and chest.

President John F. Kennedy (1917–63) Dallas, TX; while riding in the presidential limousine was hit by two of the three shots fired and died on November 22, 1963. The first bullet hit him in the upper back and passed through his throat. The second fatal hit was in the back of the head and he was declared dead 30 minutes after the shooting. Texas Governor John B. Connelly, Jr. (1917–93) was also hit.[64]

Assassin Lee Harvey Oswald (alias "Alek J. Hidell" – the name he used to purchase the rifle and revolver, aka "O. H. Lee," the name given at his rooming house) (1939–63), fired three shots with an Italian 6.5x52mm Mannlicher-Carcano Mod. 91/38 short rifle (six-round) with a Japanese-made 4x18 Ordnance Optics telescope. (Some theorize other assassins were involved, but no conclusive evidence exists. Some bystanders claimed hearing additional shots from other directions, but this was caused by echoes among the buildings.) The three shots' ranges were approximately 175, 240, and 265ft (53, 73, and 81m). One other bystander, besides Governor Connelly, was slightly wounded. Oswald shot and killed a Dallas police officer approximately 45 minutes after the assassination with four shots from a surplus .38 Special S&W Victory Model snub-nosed revolver (six-round – commercially shortened barrel).

Oswald was subsequently shot in the abdomen by Jack L. Ruby (1910–67) firing one round pointblank from a .38 Special Colt Cobra snub-nosed revolver (six-round) on November 24, fatally wounding Oswald. Oswald had attempted to assassinate retired Major General Edwin A. Walker (1909–93), an avowed anti-communist and segregationist, in Dallas on April 10, 1963 using the same rifle.[65] He shot at Walker at a range of less than 100ft (30m) while the general sat in his dining room. The bullet was deflected by a window frame and he suffered only minor bullet fragment wounds in the forearm.

Civil rights activist Malcolm X (aka El-Hajj Malik El-Shabazz or Omowale or Detroit Red or Big Red; real name Malcolm Little) (1925–65),[66] Harlem, New York City, NY; hit by multiple buckshot pellets and pistol bullets in the left chest, left leg, and right arm and died nearly instantly on February 21, 1965. The double shotgun blast was responsible for his death.

Assassins Talmadge Hayer (aka Thomas Hagan or Mujahid Halim; wounded once by .32-caliber revolver fire from a Malcolm X bodyguard and beaten by the crowd), Norman 3X Butler (aka Muhammad Abd Al-Aziz), and Thomas 15X Johnson (aka Khalil Islam), all members of the opposing Lost-Found Nation of Islam, were convicted. The accused provided the names of other individuals they claim were responsible for or involved in the shooting, but evidence was insufficient for prosecution. Others have been accused, including local drug dealers, New York City Police Department, FBI, and CIA. Malcolm X was struck by six to eight 0 buckshot pellets (.30-caliber – 12 pellets per shell) from two rounds fired from a 12-gauge J. C. Higgins Model 1017 double-barrel shotgun (sawed-off barrels and stock), one .45 ACP bullet of three fired from a Colt M1911A1 pistol (seven-round), and two 9mm Parabellum bullets of six fired from an un-recovered pistol for a total of 15 entry wounds, three exit wounds, and four grazes. The unidentified 9mm pistol is often described as a "Luger." This may be only an assumption based on the recovery of 9mm cartridge cases and not by visual identification. Two bystanders were wounded.

SPECIFICATION:
Colt M1911

Caliber: .45 ACP
Length: 8.5in (216mm)
Barrel length: 5in (127mm)
Rifling: 6 grooves, l/hand
Weight: 9lb (4.1kg)
Magazine: 7-round

Civil rights leader Dr Martin Luther King, Jr. (1929–68) Memphis, TN; shot once, hit in the lower face, and died instantly on April 4, 1968.

Assassin James Earl Ray (1928–98) (escape passport alias "Ramon George Sneyd") fired once with a .30-06 Remington Gamemaster Model 760 pump-action rifle (four-round) with a 3x to 7x Redfield variable telescope at a range of 205ft (62m). (Interestingly, Ray had first purchased the same model of rifle in .243 Remington, but exchanged it the next day for a .30-06 model.)

Presidential candidate and New York Senator Robert F. Kennedy (1925–68) Los Angeles, CA; shot three times in the head, upper back, and neck (fourth bullet grazed his jacket sleeve) on June 5, 1968 and died June 6.

Assassin Sirhan Sirhan (1944–) fired eight shots from 4ft (1.2m) with a .22 Long Rifle Iver Johnson Cadet Model 55-A snub-nosed revolver (eight-round). Five bystanders were wounded. Some theorize a second shooter escaped, but no credible evidence exists with unsubstantiated claims that a .22 Long Rifle H&R Sidekick Model 929 revolver (nine-round) – similar in appearance to the Iver Johnson revolver – was used by this hypothesized shooter to explain discrepancies in the number of recovered bullets and fragments. Some claim up to 13 shots were heard, no doubt echoes within the confined hotel kitchen. (This assassination resulted in the Secret Service supplying bodyguards to presidential candidates.)

Presidential candidate and Governor of Alabama George C. Wallace, Jr. (1919–98) Laurel, MD; shot and wounded five times in the chest and abdomen on May 15, 1972 resulting in paraplegic paralysis. The wheelchair-bound Wallace died on September 13, 1998 from septic shock caused by complications from bacterial infection, Parkinson's Disease, and spinal paralysis.

Would-be assassin Arthur H. Bremer (1950–) fired five shots from 4–5ft (1.2–1.5m) with a .38 Special Charter Arms Off Duty snub-nosed revolver (five-round). Three bystanders were wounded. Bremer first plotted to assassinate President Richard M. Nixon (1913–94) in preference to Wallace. He had planned to use a Belgium 9mm FN-Browning Hi-Power pistol (13 rounds) in April 1972 in Ottawa, Canada. The pistol became

lodged in his car's wheel well where it was hidden and he was unable to recover it, thus foiling his plan.

President Gerald R. Ford, Jr. (1913–2006) San Francisco, CA; shot at once and not hit on September 22, 1975.

Would-be assassin Sarah Jane Moore (1930–) fired one shot from a .38 Special S&W Model 60 revolver (five-round) at 41ft (12m). A disabled Marine veteran saw the revolver and grabbed her gun hand forcing her shot to miss by 5ft (1.5m), ricochet, and slightly wound a bystander. Moore had been apprehended the day before and released by the police, but they confiscated an unregistered .44 Special Charter Arms Bulldog Model 14420 snub-nosed revolver (five-round). Moore later complained she was forced to use a revolver other than the .44 Special she had practiced with.

Previously, on September 5 in Sacramento, CA questionable assassin Lynette A. "Squeaky" Fromme (1948–) drew a .45-caliber Colt M1911A1 pistol (seven-round) on President Ford as he reached to shake her hand in a crowd. A Secret Service agent wrestled her to the ground and disarmed her. There were four rounds in the magazine and the chamber was empty. She claimed she intended only to frighten Ford and not shoot him.

California Representative Leo J. Ryan, Jr. (1925–78) Jonestown Airport (Port Kaituma), Guyana; shot several times and died on November 18, 1978.[67]

During an investigation of the radical People's Temple cult, Representative Ryan, aides, reporters, and People's Temple "defectors" were boarding two aircraft to depart Jonestown. People's Temple henchman Larry Layton shot two of the "defectors" in an airplane. At the same time assassins Thomas Kice, Sr., Joe Wilson, Ronnie Dennis, and at least two other unidentified People's Temple members, sent by cult leader Jim Jones (1931–78), opened fire at close ranges with automatic pistols, .22-caliber semiautomatic rifles, and shotguns firing dozens of shots. Ryan and four of his party were killed and ten wounded. Some of those hit, including Ryan, were subsequently shot multiple times at pointblank range to finish them off. Ryan was bullet riddled. Before the firearms attack, a People's Temple member, Don "Uara" Shy, attempted to attack Ryan with a knife succeeding in injuring only himself. A total of ten pistols, 13 .22-caliber rifles, and

seven shotguns were recovered in Jonestown, but the calibers, makes, and models are not available. Because of the mass murder/suicide of most of the People's Temple members (909) that night, including the unidentified gunmen, the details will never be known. Larry Layton survived and was apprehended, but could not detail events of the murders. Ryan is the only congressman who has died in the line of duty.

President Ronald W. Reagan (1911–2004) Washington, DC; wounded in the upper left side and lung by one bullet ricocheting off the presidential limousine on March 30, 1981 while entering the limousine.

Would-be assassin John W. Hinckley, Jr. (1955–) fired six shots from a West German .22 Long Rifle (5.6mm lfB) Röhm RG-14 snub-nosed revolver (six-round)[68] from 16ft (4.8m). Three bystanders were wounded. (The bullets were explosive Devastator rounds, all of which failed to detonate. They contained a tiny "canister" of highly explosive lead azide intended to fragment the bullet upon impact.)

President William J. Clinton (1946–) Washington, DC; Clinton was not shot at directly during the bungled October 29, 1994 attempt, as he was elsewhere inside the White House.

Would-be assassin Francisco M. Duran (1968–) fired 29 rounds from a Chinese 7.62x39mm Norinco SKS-D carbine (30-round – copy of Soviet Simonov SKS carbine with high-capacity magazine) at the White House and a group of individuals he thought included Clinton, at a range of approximately 230ft (70m). There were no casualties. While reloading he was wrestled to the ground by three bystanders and sentenced for attempted assassination and assault of Federal officers.

President George W. Bush (1946–) Tbilisi, Georgia (former Soviet republic); with no injuries inflicted during the failed May 10, 2005 hand grenade attack. The attack was also aimed at Georgian President Mikheil Saakashvili (1967–). Bush and Saakashvili did not learn of the attack until after the rally.

Would-be assassin Vladimir Arutyunian (1978–) threw an armed (pin pulled) Soviet RGD-5 fragmentation hand grenade that landed 61ft (18.6m) from the President having been deflected when it glanced off a girl in the

crowd. It failed to explode as a red tartan handkerchief tied tightly around the grenade for concealment prevented the arming lever from flying off. At that distance it probably would not have been fatal to the presidents, who were partly protected to the sides by bulletproof glass panels, but spectators would have suffered terribly. The RGD-5's casualty radius is up to 65ft (20m). Arutyunian stated he threw the grenade in a manner to obtain an airburst to overcome the panels. Georgian authorities initially claimed it was a harmless training grenade ("inactive grenade" the media called it), but it was proven to be a live casualty-producing grenade. When captured on July 20, Arutyunian killed the Georgian Ministry of Internal Affairs' Anti-Terrorist Department chief with a handgun and was himself wounded three times.

Then there is the not dissimilar December 14, 2008 "shoe-icide attack" on President Bush by Iraqi journalist Muthathar al-Zaidi in Baghdad, Iraq. Two size 10 shoes were thrown from 12ft (3.6m). Both missed. One bystander suffered a shiner when a microphone was knocked over.

In a February 7, 2001 shooting incident mentally disturbed Robert W. Pickett (1955–) harmlessly discharged two to five shots (there are conflicting reports) in the general direction of the White House from some 200yd (180m). It appears not to have been a viable assassination attempt and is not included here as such. He used a Rossi .38 Special Model R35102 snub-nosed revolver (five-shot) (sometimes reported as a Taurus, which is similar to a Rossi). The shooter was wounded and apprehended by the Secret Service.

Arizona Representative Gabrielle D. Giffords (1970–) Casas Adobes, AZ; was shot once through the left side of the head on January 8, 2011, but survived. She was the primary target, but Arizona Chief Federal District Judge John M. Roll (1947–2011) was killed along with five bystanders and 13 others were wounded. One of the dead was a nine-year-old girl, the only child killed in the assassinations studied here. Judge Roll was shot once in the back attempting to protect another victim.

Assassin Jared L. Loughner (1989–) fired 33 rounds from an Austrian-designed, US-made 9mm Glock 19 (G19) pistol (initially misreported as a larger G17) with a special 33-round magazine from 3–4ft (1 to 1.2m). While attempting to reload another 33-round magazine,[69] three bystanders wrestled him to the ground and disarmed him. Loughner had managed to

reload, but the pistol failed to fire as the magazine had been damaged in the scuffle. He was also armed with a 4in blade Buck tactical knife.

President Barack H. Obama II (1961–) Washington, DC; nine shots were fired at the White House in a drive-by shooting on October 11, 2011. Even though President Obama and his family were not present, the shooter was charged with attempted assassination. There were no injuries.

Bungling assassin Oscar Ramiro Ortega-Hernandez (1990–), attending an "Occupy Wall Street" movement protest, fired at the White House from a halted 1998 Honda Accord at a range of approximately 660yd (600m) striking the residential area twice. The other rounds probably hit the ground, trees, or flew over the White House. The shooter was arrested five days later. The weapon was reported as a "semiautomatic AK-47 style assault rifle." It was a Romanian-made 7.62x39mm Cugir semiautomatic rifle (30-rounds – a copy of a Russian AKM and indeed similar to an AK-47) equipped with a telescope (make and power not listed). The shooter had three spare magazines and several cartons of ammunition. He was also armed with brass knuckles and an aluminum baseball bat.

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[1] The StG.44 should not be called a "storm rifle" or "storm assault rifle" as is sometimes amateurishly encountered. In a military context the German *Sturm* means "assault."

[2] The Bureau of Alcohol, Tobacco, Firearms, and Explosives was formerly the Bureau of Alcohol, Tobacco, and Firearms – "Explosives" was added on January 24, 2003. It is still commonly referred to as the "ATF."

[3] German-born Borchardt emigrated to America in 1860 and at one time or another was employed in turn by Singer Sewing Machine, Pioneer Breech-Loading, Colt, Winchester, and Sharps arms companies. He returned to Germany in 1881 to develop the 7.65mm Borchardt C93 pistol, from which the Luger evolved.

[4] In Germany the pistol was commonly known as the *Pistole Parabellum.* Stoeger, Inc. bought the US sales rights in 1923, selected "Luger" as a unique marketing name, and registered it as a Stoeger trademark. Generally though, it was known as the "Luger" since its inception. It is not "Lüger," "Lugar," or "Lugger" (which is a sailboat) as are occasionally encountered.

[5] It is often stated that "Parabellum" simply means "for war," but that would be *pro bello.*

[6] Luger magazines hold eight 7.65mm or 9mm rounds. Magazines are interchangeable between pistols of either caliber.

[7] FN coined one of the best firearm advertising slogans ever. The Hi-Power was one of the earliest high-capacity magazine pistols marketed. "The Browning Hi-Power can count to 13 faster than you can."

[8] Patchett was a well-known motorcycle designer and racer in the 1920s and '30s before becoming an arms engineer at FN and then Enfield.

[9] During World War II some 113,000 Bren gun carriers were built in Britain, Canada, Australia, the United States, and New Zealand making it the most numerous AFV ever produced.

[10] Owen is often identified as a "lieutenant," but served in the Australian Army for only 13 months as a private in 1940–41. When his invention was accepted he was discharged and transferred to the Central Inventions Board.

[11] The Russians used "Bolo Mausers" in this caliber in the 1920s and it provided the basis for their slightly more powerful 7.62x25mm pistol and submachine gun round adopted in 1930.

[12] The British soldier called it the "G-P-M-G" and not the "Gimpy," "Jimpy," or "Gympy," which appears to have been coined by a television scriptwriter. A "Gimpy ringtone" is available for cell phones with the sound of the L7A1 GPMG being charged and firing off bursts.

[13] The German soldier (Landser) had a colorful variety of nicknames for machine guns: *Dünnschißkanone* (diarrhea cannon), *Gartenspritzer* (garden sprinkler), *Hitlersäge* (Hitler's saw), *Hitlergeige* (Hitler's violin), and *Schnatterpuste* (chatter breath) among many others.

[14] The *Ludwig Loewe und Company* (which became a component of DWM in 1896) received a seven-year license from Maxim in 1892 and began producing the weapon for the Kriegsmarine in 1894. After the license expired, DWM received a license in 1899 and began producing the Maxim MG.99 in 1899 for the *Reichheer* (National Army). It was replaced by the Maxim MG.08, the "Spandau," in 1908.

[15] "AR" meant "ArmaLite," not "ArmaLite Rifle" or "Assault Rifle" as is sometimes reported. (The AR-5 was a .22-caliber bolt-action survival rifle and the AR-17 was a semiautomatic sporting shotgun, for example.) After Colt bought the rights to the AR-15 in 1959, that firm claimed "AR" meant or was "changed" to "Assault Rifle."

[16] The US Air Force designated SMG versions GA = Airborne Gun, U = Unit. Actually, being a shoulder-fired weapon it does not fit in the GAU category and it is not known why this designation was assigned. It is usually assigned to aircraft-mounted guns. It does *not* mean "Gun, Automatic, Unit" as sometimes claimed. That "designation" was invented by someone trying to provide an explanation of the GAU code. The later GUU-5/P code means "gun, miscellaneous personal equipment."

[17] Additionaly there is a myth that military issue M16s were actually produced by the Mattel Toy Company. "Proof" has been offered showing the receiver of an M16 marked Mattel Toy Co., but this was most likely photoshopped.

[18] Manufacture d'Armes de Châtellerault (MAC). FM = *Fusil-Mitrailleur* (machine gun).

[19] Numerous models of Hotchkiss machine guns were made in France and used worldwide, but Benjamin B. Hotchkiss (1826–85) was an American who resided in France from 1867.

[20] The M50 and M55 designations were the commercial model numbers and not assigned by the military. Reisings were never assigned military "M" and "T" designations.

[21] Marine parachute units should never be called "Paramarines." It was not an official designation, but invented by journalists. The Marines felt it implied their parachute troops were "half-marines." Officially, from 1941–44, Marine parachute units were designated, e.g. 1st Parachute Battalion.

[22] The M14E1 rifle of 1960 with a folding stock and pistol grip was tested for possible use by paratroopers, mechanized infantrymen, and Air Force Security Police, but was never standardized as it was unbalanced.

[23] Only three of the seven Army divisions, the 1st, 25th, and 4th Infantry Divisions, deployed to Vietnam with M14 rifles, along with the 1st and 3rd Marine Divisions. All other divisions and separate brigades arrived with M16A1 rifles.

[24] The round was developed in 1918 to be fired from modified M1903 Springfield rifles using a special device that replaced the bolt-action to turn it into a semiautomatic rifle, the "Pedersen device." See "What was the Pedersen device?" The round was also used in the French MAS-38

submachine gun, probably the most underpowered submachine gun of the war, which was otherwise a good design. (MAS = *Manufacture d'armes de Saint-Étienne,* the primer French military arms manufacturer.)

[25] It is often said that the *Patrone 318* is a necked down 13.2x92mmSR cartridge first used in a German World War I antitank rifle (*T.Gew*). (See "What were the first dedicated antitank weapons?") These cartridges are of entirely different design having different dimensions and rim styles.

[26] Unlike most German weapons, which were designated after the year of adoption, the MG.15 was a series designation.

[27] The rifle is occasionally found misspelled as "Boyes." It was named in honor of Captain Henry C. Boys (1885– 1937), Assistant Superintendent of Design on the Small Arms Committee, the rifle's principal designer, and the designer of the above Enfield revolver. Boys died just before the rifle was adopted. It was originally called the "stanchion gun" as a codename. (A "stanchion gun" was a large swivel-mounted shotgun mounted in a punt [small boat] used to down large numbers of water fowl for commercial hunting.)

[28] The first Nambu pistol, from which the Taisho Type 14 was derived, was developed in 1902 and production began in 1906. It is often reported as being introduced in 1904. These early Nambus had official designations of *Nambu Shiki Jido Kenjo Ko* (Nambu automatic pistol Type A). There was also a rare scaled down 7mm "Baby Nambu" designated the Type B. They were privately purchased by many officers who were normally issued the dismal 9mm Meiji Type 26 (1893) revolver, which saw use in World War II.

[29] The Soviet 7.62x25mm Tokarev, also used in their various submachine guns, is interchangeable with the obsolete German 7.63x25mm Mauser round, but the Soviet round has a slightly more powerful propellant charge and should not be fired in older 7.63mm pistols.

[30] Uziel Gal was born in Germany, fled to Britain in 1933, and then migrated to Palestine in 1936. He was imprisoned by the British from 1943–46 for illegally carrying a weapon. Retired, Gal emigrated to America in 1976 to obtain special medical care for his severely disabled daughter.

[31] The Russians originally designated the 7.62x54mmR cartridge the "three-line" (*trechlineynaja*) under an old pre-metric system of measurement. A "line" equals 1/10inch so "three-line" equals 3/10inch or .30-caliber (7.62mm).

[32] Sometimes incorrectly called the ".45 *Long* Colt."

[33] Moros are an Islamic warrior society of Malayan descent who live on western Mindanao, southern Palawan, and the Sulu Archipelago and remain outside of mainstream Filipino society to this day.

[34] From "The Soldier's Song" attributed to Captain Lyman A. Cotton, 1899. Sung to the tune of the American Civil War song, "Tramp, Tramp, Tramp, the Boys are Marching."

[35] The tests were headed by Colonel Louis A. LaGarde and Captain John T. Thompson, who later invented the namesake submachine gun. The tests were conducted on live animals at a slaughterhouse and on human cadavers obtained from a medical school.

[36] Collectors refer to the original long-barreled revolver as the "Cavalry Model" and the reworked short barrel as the "Artillery Model." These are not official designations and few of the "Artillery Model" were issued to artillerymen.

[37] The Deutschland-class ship was named after Vice Admiral Maximilian Graf (Count) von Spee (1861–1914), who died during the battle of the Falkland Islands, going down with all but two of his five cruisers and three auxiliaries. His squadron was ambushed by seven Royal Navy cruisers much as the *Graf Spee* would have if she had sortied into international waters in 1939. The *Spee* went down just over 400 miles from where Admiral von Spee and his squadron met their fate.

[38] Not to be confused with the considerably larger British 120mm L6 "Wombat" recoilless rifle.

[39] The round is sometimes incorrectly reported as "20x85mm"; 85mm being the cartridge's *overall* length, not just the case length.

[40] While commonly called the "AT4" by soldiers and Marines, the replacement for the M72-series LAW is officially designated the M136 light antiarmor weapon (LAW). The AT4 is seldom called a LAW by the troops as the M72 is normally thought of as *the* LAW. The XM72 LAW was codenamed the MASHIE (a "short-iron" or "approach club" referring to golf clubs) during development. The weapon is sometimes called the "LAWS," "LAAWS," or "LAAW" – Light Anti-Armor Weapon System, but LAW is the more commonly used term. It has also been incorrectly called a "rocket mortar." The program names of medium assault weapons (MAW) for the Dragon missile and heavy assault weapon (HAW) for the TOW (tube-launched, optically-tracked, wire-command link guided) missile never caught on.

[41] The first British use of tanks was at Flers-Courcelette on September 15, 1916 during the Somme offensive, but only 36 were employed and most broke down or were soon knocked out (13 others did not make it into action). It is often stated that the first use of tanks was at Cambrai on November 20, 1917, but that was the first large scale employment of British tanks – 476. The first use of French tanks was on April 16, 1917 during the Second Battle of Aisne, seven months before Cambrai. Most of the 129 tanks were knocked out by artillery or broke down. Germany's first use of its few tanks was on April 24, 1918 at the Second Battle of Villers-Bretonneux with 29 tanks. US tanks saw their first action on September 12, 1918 during the battle of St Mihiel; two months before the Armistice. There were 144 French-supplied US-manned tanks backed by 275 French-manned tanks. France built more tanks than all other countries combined during World War I.

[42] The 13.2mm cartridge influenced the design of the US .50-caliber machine gun round. The round would also have been used in the *MG.18 Tank und Flieger (T.u.F.) Maschinengewehr* (cover designation *Maschinengewehr SS*) intended as an antitank and antiaircraft machine gun to be fielded in 1919. This two-wheel carriage-mounted, water- cooled, scaled up Maxim-type machine gun would have been devastating to the era's thinly armored, slow moving tanks.

[43] *Otto-Otto* was also the German radio code for an enemy aircraft caught in a searchlight beam.

[44] "Bazooka" Burns conducted USO show tours entertaining servicemen during World War II accompanied by his original bazooka. Another fact that many are not aware of; he joined the Marine Corps in World War I making sergeant in the 11th Marines and served as the Marines' jazz band conductor after the war. Some sources incorrectly state he was in the Army's 29th Division.

[45] As an aside, the Geneva Convention is often cited as outlawing or prohibiting some weapon or another. The Geneva Convention codifies the treatment of prisoners of war, internees, and civilians. It is the Hague Convention (or Protocol) that addresses weapons (and other issues) and its guidelines are very broad, open to interpretation, severely outdated, and generally ignored by the enemies of democracy. Both are oft quoted, often incorrectly. They can be found on the Internet for those who wish to become more familiar with them.

[46] The abbreviations of these weapons are found in both upper and lower case in official publications.

[47] Not to be confused with the Dutch-designed 105mm MOBAT (Mobile Artillery) truck-mounted howitzer introduced in 1999.

[48] It is reported that the first Australian units deploying to Vietnam had MOBATs, but it is believed they left them at home station.

[49] It is said that the 84mm caliber was selected as the barrels of four old 8.4cm m/94-06 fortress cannons at Tingstäde-Gotland were used in prototypes. This is not confirmed and is doubtful as gun barrels of that type would be very thick and heavy.

[50] The M120 is ground-fired and the M121 is fired from within an M106A3 full-tracked carrier and M1129 Stryker mortar carrier vehicle (MCV-B), but can also be dismounted and ground-fired. The 120mm was initially designated the M285. The 4.2in M30 mortar and its earlier predecessors (M1, M1A1, M2) were of a somewhat different design than other US mortars, although the barrel of the earlier models was derived from the 4in Mk I Stokes.

[51] It is sometimes said that the 4.5in M1 gun was a British design, but while using British ammunition, it was of US design and used the same carriage, recoil system, and breech systems as the US 155mm M1 howitzer.

[52] An additional AA gun was the stillborn 40mm M247 Sergeant York division air defense gun (DIVAD) of 1983. This self-propelled (M48A5 tank chassis), radar-directed twin gun was so fault-ridden and operationally complex that while it was type classified, the project was terminated in 1986.

[53] Interestingly, the .30-06 ammunition was loaded in US arsenals, given misleading headstamps, and dated 1940 so that it could not be traced to US origin. It is often reported that these rounds were made specifically for the Bay of Pigs invasion, but actually they were procured by the CIA in 1953 for general use in covert operations. Regardless of the misleading headstamps, the cartridges used exactly the same materials as other US cartridges, M2 ball bullets, and the same red sealing lacquer on the case mouths and primer pockets.

[54] It is not common knowledge that 1st Lieutenant Thompson, while in command of an ordnance depot in Tampa, Florida in 1898, was approached by 2nd Lieutenant John H. Parker who asked to be issued four .30-40 M1895 Gatling guns stored at the depot, without higher authorization. The formation of the unprecedented Gatling Gun Detachment was eventually officially approved, but not necessarily accepted. Thompson not only provided Parker with the guns and large ammunition stocks, but helped "Gatling Parker" to surreptitiously ship the guns to Cuba where they made history.

[55] The story is usually incorrectly related as being an Army officer commanding the American Expeditionary Force's machine gun school in France. As a lieutenant Parker had become famous as "Gatling Parker" during the Spanish-American War for his employment of Gatling guns in support of the San Juan Hill action.

[56] The M2E50 is not designated in the Army series. "E50" in this case is the commercial designation for "Enhanced .50-caliber." It has also been referred to as the M2E2 and M2A1.

[57] The 105mm XM103 and XM104 were self-propelled howitzer variants of the M102 that were never standardized.

[58] With few exceptions the following weapons and equipment items, while of foreign design, are/were manufactured in the US. For example, FN Herstal USA, manufacturing M4 carbines, M16 rifles, and M240 and M249 machine guns, produces 70 percent of the small arms carried by US service men and women. Many of these weapon systems are key armaments in the US inventory. Only those marked with (x) are produced overseas. Additional foreign weapons and equipment items are undergoing testing by the US armed forces today.

[59] Varmints are defined as pest or nuisance animals and include squirrels, chipmunks, gophers, prairie dogs, woodchucks, nutria, raccoons, possums, skunks, coyotes, javelina, feral hogs, and wild dogs. Some may be hunted for food, but most are hunted to eradicate or control their numbers.

[60] The ball was actually .41-caliber to allow for a cloth patch wraped abround the bullet for a snug fit.

[61] "Automatic" refers to it being an automatic self-ejector when the cylinder is broken open.

[62] "Bull Moose" refers to the 1912–16 Progressive Party.

[63] Subsidiary of Iver Johnson Arms marketing lower grade revolvers.

[64] The "unusual" path of one of the bullets (the so-called "magic bullet") after exiting the President's throat struck Texas Governor Connelly leading to the theory that a special Italian military fragmenting bullet was used. This is not the case. Bullet tracks after being deflected by bones and fragmenting frequently follow erratic and unpredictable paths. This bullet created three entry and two exit wounds in Kennedy and Connelly. It hit Connelly in the back right shoulder, exited his lower chest, and hit his wrist with a fragment hitting his thigh. The supposed "fragmenting" bullet in question was the *cartucci a mitraglia* (canister cartridge). It had a 2in long bullet extending well into the case. The jacket had three or four lengthwise slits and contained six stacked lead slugs. Intended

for riot control or guard duty, when fired the jacket peeled off after emerging from the barrel and the slugs spread in a shotgun effect. In order to have inflicted the wounds suffered by Kennedy and Connelly the bullet would not have broken up until it hit Kennedy and this round did not function in such a manner, but broke up at the muzzle and had only a very short range. Owing to the spread of the slugs it is doubtful if Kennedy would have been hit by such a bullet.

[65] Other than the planned assassination of General-in-Chief Ulysses S. Grant during the Lincoln assassination, there has been no attempt on a serving US armed forces flag officer (general or admiral). The General George S. Patton (1885–1945) assassination theory is pure myth. The Walker incident is the only known attempt on a retired flag officer.

[66] The "X" stood for the unknown original African surname of the slaves from whom Black Muslims were descended, in preference to continuing to use a name given by the slave owner.

[67] Even the official FBI report fails to mention the number of times he was shot and where or the caliber of the weapon(s).

[68] Often incorrectlu listed as an "R6-14," probably owing to someone mistaking the "G" for a "6" in small print.

[69] The 33-round magazines have been misreported as 30 and 31-round, which also exist. He also possessed two 15-round magazines.

2.
WEAPONS MYTHS

There are more myths and rumors in firearms circles than there are about boys among pre-teen girls. Of the many myths involving weapons some have taken on a life of their own and will just not go away. Some appear to be an effort to explain some "unfathomable" fact or provide a rationalization for unusual aspects of weapons. Others were created by misconceptions, assumptions, or misunderstandings and are typically based on some fact taken out of context. Others are merely "war stories," the martial equivalent of the urban myth.

"A half truth is like a half brick; it can be thrown a considerable distance."
Oliver Wendell Holmes

This chapter strives to clear up such misconceptions that have sometimes been accepted as fact. Though usually not creating a dangerous situation, there are some myths that do just that.

What was the "SCHMEISSER" machine pistol?

What is commonly, but incorrectly, called the "Schmeisser" refers to the German World War II 9mm MP.38 and MP.40 machine pistols, or submachine guns. They were developed by *Erfurter Maschinenfabrik* (Erma). The MP.40 was developed to speed up production and there were actually two versions, the MP.40 and MP.40/II with minor design changes simplifying production. Usually when a weapon is redesigned to speed up production its cost is reduced, but the MP.40 actually costs slightly more than the MP.38. US troops dubbed these submachine guns "burp guns,"

owing to their 500rpm rate of fire, a general nickname sometimes applied to other submachine guns. The German soldier called any machine pistol a *Kugelspritz* (bullet-squirter).

Hugo Schmeisser did not design the weapons nor did he have a role in their development. He was chief engineer for *C. G. Haenel Waffenfabrik* and did not work for Erma. He did have a hand in the development of the MP.41, but this was nothing more than an MP.40 fitted with a rifle-type wooden shoulder stock and no internal design changes other than a selective-fire lever (MP.38 and MP.40 were full-automatic only). The MP.41 was designed as a more effective infantry weapon as its folding stock predecessors were originally designed for tank and halftrack crews. Its short-lived production was halted owning to Erma suing Haenel over patent infringement – yes, that sort of thing happened in wartime Nazi Germany. Schmeisser did design the predecessor of the 7.9mm MG.34 machine gun, the MG.30, and designed several other weapons including the 9mm MP.34 machine pistol and, his most important achievement, the 7.9mm MP.43 and MP.44 machine pistols, later redesignated assault rifles (*Sturmgewehr*), as well as their predecessor, the 7.9mm MKb.42(H) machine carbine (MKb. = *Machinenkarabiner*; H = *Haenel*). None of these weapons were known as "Schmeissers."

FACT:
There were two Schmeissers doing arms design work. Louis Schmeisser (1848–1917) designed the world's first submachine gun in 1917, the MP.18/I. His son, Hugo Schmeisser (1884–1953) developed later automatic weapons including the MKb.42 machine carbine, the predecessor of the MP.43/Stg.44 assault rifle. One sometimes sees their names mixed up in references. It is not widely known that Hugo Schmeisser was forced to work for the Soviets from 1945–52 and had a hand in the final design of the AK-47 assault rifle while working for Mikhail Kalashnikov.

Why was the German MG.34 called the "SPANDAU"?

Occasionally in literature one will see the German 7.9mm MG.34 machine gun called a “Spandau” or even a “Schmeisser” as sometimes was the MG.42.[70] This may be due to ignorance, poor research, or misunderstanding or confusion between the weapons. Calling an MG.34 a “Schmeisser” generally means it was confused with the machine pistols;[71] calling it a “Spandau” is due to confusion with the World War I-era 7.9mm MG.08 water-cooled heavy machine gun that was commonly called a Spandau by the British Tommy. The arsenal’s name was predominately marked on the feed cover, and since the MG.08, a Maxim-design, was made at *Spandau Gewehrfabrik* outside of Berlin (as well as at other factories), the name was adopted. The Germans themselves did not call it a “Spandau,” but the *Maxim-Maschinengewehr* or *Maschinengewehr “S.”* The “S” was stamped on MG.08s when the sight was modified for the heavier (*schwere*) bulleted ammunition resulting it being nicknamed as such, “S” (pronounced “ess”). During World War II British soldiers sometimes referred to the MG.34 as the “Spandau.” It is thought they called this entirely different weapon the “Spandau” simply because their World War I veteran fathers talked about the main German machine gun, the MG.08, being the Spandau when relating their experiences. The MG.34 was designed by *Waffenfabrik Mauser A. G.* and was not produced at the old Spandau plant.

SPECIFICATION:
MG.34

Caliber: 7.92 x 57mm
Feed: 50-round belt or 75-round saddle drum
Cyclical rate: 900rpm
Length: 48in (1,219mm)
Barrel length: 24.7in (627mm)
Rifling: 4 grooves, r/hand
Weight: 26.11lb (12.1kg)

The 3in mortar ain’t

The British adopted the **Stokes 3in Mk 1 trench mortar** in 1915. It was adopted by the US in 1917 and remained the standard US mortar until it began to be replaced by the 81mm M1 in 1937. The US 3in remained in use until at least 1942, seeing action in the defense of the Philippines and as a training weapon. The British adopted an improved 3in Mk 2 (a much different weapon than the Mk I) in the early 1930s and fielded additional marks through World War II. It began to be replaced by the 81mm L16A1 in the early 1960s. Virtually every civilian reference publication states the 3in mortar had a caliber of 76mm (3in), however, the "3-inch" mortar had an actual bore of 3.189in (81mm). Few British or American manuals on the 3in provide its actual caliber for some unknown reason, even on diagrams of the mortar annotated with all other dimensions.

FM 23-90, *81mm Mortar, M1,* May 7, 1942, states that 3in ammunition could be fired from 81mm mortars for training and 81mm could be fired in 3in mortars using a reduced propellant charge. As such, 3in rounds were fired from 81mm mortars in combat in the Philippines in 1941– 42 as small numbers of the latter had been delivered without ammunition just prior to the war. Rounds intended for the 81mm M1 could be fired in the 3in with reduced charges. In fact, even late in the war 81mm mortar ammunition boxes were marked "MORTARS, 81MM. M1 & 3IN. MK 1A2." During World War II the British modified the 3in mortar to allow it to fire captured Italian 81mm mortar ammunition in North Africa (the modification required a change to the firing pin design as the Italian ignition cartridge and propellant charge were different). No rationale has ever been discovered as to why the British chose to call it a 3in rather than a 3.2in mortar (they used decimal point calibers for other weapons), other than possibly "streamlining" the designation and placing it in line with the Stokes 4in mortar, which was *actually* 4in (102mm), but it has caused some confusion and many arguments over the years.

Where did the nickname "KNEE MORTAR" come from?

The **Japanese 5cm Type 89 (1929) handheld grenade discharger** (*hachikiku shiki jutekidanto*) was nicknamed the "knee mortar" by US troops who encountered it on Guadalcanal in 1942. This was because of its **curved base plate, which seemed to fit the contour of the thigh**

suggesting it could be fired from a kneeling position with the base plate against the thigh … without injury. The curved base plate was actually intended to be jammed into the ground and held by hand at the necessary firing angle. It is often claimed that firing it from the thigh resulted in a broken femur. The grenade weighed 1.175lb (0.533kg) and the propellant charge was only 18.8 grains of smokeless powder, less than most rifle cartridges. However, the heavy weight of the grenade increased the recoil. It might not break the firer's leg, but he would not try it again.

Another theory for the source of its nickname was that it was carried in a canvas bag strapped to the thigh. This is not true as this would be a most awkward means of carriage – try walking with a 10.06lb (4.56kg) hunk of steel strapped to your thigh. That's equivalent to three bricks … why would anyone even consider doing that? They were normally carried broken-down in a tubular canvas case slung over the shoulder or strapped to the backpack. The nickname may too have been derived from it being fired with the gunner assuming the kneeling position, its standard firing position; it was also fired from the prone position.

The Japanese referred to the *juteki* (abbreviation of *jutekidanto*) as a 5cm heavy grenade discharger and it fired purpose-made mortar projectiles, pyrotechnic signal flares and smoke rounds, and special hand grenades with propelling charges attached. The concept can be traced back to the 5cm Taisho Type 10 (1921) grenade discharger (*jnenu nenshiki jutekidanto*). The Japanese considered grenade dischargers a basic infantry weapon along with rifles, light machine guns, hand grenades, and bayonets. They were much disliked by the Allies as they could be brought into action very quickly to deliver accurate, close-in fires. Assault troops closing in on a Japanese position would be barraged with rapid-fire salvos of grenades falling on them at up to 25rpm. An experienced gunner using the grenade rounds could achieve airbursts at longer ranges.

Several similar developmental efforts were undertaken by the US in World War II. Some test weapons even used Japanese grenade dischargers re-barreled with 60mm tubes. They were unsuccessful, but the efforts eventually resulted in the standard US 60mm M2 mortar being modified in 1945 as the M19 (T18E6) to enable it to be fired in the handheld mode by adding a trigger and an optional curved base plate, not unlike the Japanese grenade discharger's. When the 60mm M224 lightweight company mortar was standardized in 1977 the trigger fire and optional handheld base plate

capabilities were retained. In effect, the US 40mm M79 and M203 grenade launchers also filled the role of the old Japanese "knee mortar," that is, providing the rifle platoon with an indirect high-explosive fire capability.

Were BIBLICAL REFERENCES marked on US weapon sights during the War on Terror?

Yes, they were. One newspaper headline proclaimed, "U.S. Military Weapons Inscribed with Secret 'Jesus' Bible Codes from the New Testament." However, these "secret codes" (there's nothing like media hype and the possibility of uncovering a heinous conspiracy) were not officially condoned and were unilaterally added by the manufacturer. The military was not even aware of their existence. The "codes" in question were in fact citations to Biblical passages and the news broke in January 2010. However, civilian shooters, online action gamers, and military personnel openly discussed the existence of verses on Internet discussion groups and forums since at least 2006.

The Advanced Combat Optical Gunsights (ACOG) were made by Trijicon of Wixom, Michigan and were issued to the US Special Operations Forces, Army, and Marine Corps, as well as to the British Army and Iraqi and Afghanistan armies and security forces. US military rules specifically prohibit the proselytizing of any religion in Iraq or Afghanistan and were established to prevent claims that the US was embarked on a religious "crusade."

One example of the Biblical citations is "JN8:12" – John 8:12, "Whoever follows me will never walk in darkness, but will have the light of life." Another is "2COR4:6" – Second Corinthians 4:6, "For God, who commanded the light to shine out of darkness, hath shined in our hearts, to give the light of the knowledge of the glory of God in the face of Jesus Christ." Other verses were from Revelation and Matthew.

The quotes, all of which included the word "light," implores for the sights to be effective and indirectly aid the shooter. The company maintained there was no conspiracy, that it was not directly prohibited by contract specifications, and it meant no harm or to imply it was evangelizing or attempted a "crusade." The company website stated, "We believe that America is great when its people are good … This goodness

has been based on Biblical standards throughout our history, and we will strive to follow those morals."

A spokesman for the Military Religious Freedom Foundation, an advocacy group seeking to preserve the separation of church and state within the military stated, "It's wrong, it violates the Constitution, it violates a number of federal laws." Those remarks are questionable. The same spokesman also claimed, "It allows the Mujahedeen, the Taliban, al Qaeda and the insurrectionists and jihadists to claim they're being shot by Jesus rifles." This concern does have some validity as the practice could be used as a propaganda tool by the enemy.

The company voluntarily removed the marking from all sights still in the inventory and ceased marking the sights. Kits were also provided to all users so the markings could be removed by units in the field.

Is it true that the 3.5in BAZOOKA was not developed until the 2.36in bazooka proved inadequate against T-34 tanks in Korea?

When North Korea invaded the south in June 1950 it was quickly found that the World War II 2.36in M9A1 bazooka could seldom defeat the Soviet-supplied T-34/85 tank. This was due to not only the T-34/85's thick armor, which actually varied from 0.79 to 3.54in, but its well sloped and angled hull and turret armor. The 2.36in could penetrate 4.7in of armor at zero degrees impact, but the T-34/85's well-sloped armor often deflected hits. The 2.36in mortar was effective against North Korea's other principal AFV, the SU-76M 76.2mm self-propelled gun as well as being used against field fortifications and caves. Often described as an "assault gun," the SU-76M's armor was far too light for such a description with it varying from only 0.62 to 1.37in.

It is often reported, implied, or assumed that the 3.5in "super bazooka" was not developed until after this was discovered. In fact, development of the 3.5in M20 (T74) bazooka had begun in late 1944 and it was standardized in October 1945. Even with a wartime rush it probably could not have been fielded until mid-1946 at the earliest if the war had continued. Nor was it really needed if Japan had been invaded; their tanks were easily defeated by the 2.36in. Limited series production of the "three-point-five" began in 1948. (A 3.25in T16 bazooka has previously been

under development.) It was issued to units in Germany and the States, but not to the four divisions in Japan as it was assessed that no significant armor threat existed in the Far East region. They were considered only as occupation troops and not a forward deployed contingency force liable to be committed to combat.

Directly after the invasion in 1950 the 3.5in went into immediate full production and was flown to units fighting in Korea, which had deployed from Japan in June and July; only the first three deploying army divisions (24th and 25th Infantry and 1st Cavalry) were equipped with the 2.36in. A small number of "super bazookas" were flown to Korea even earlier and used by the 24th Infantry Division from June 18, during the battle of Taejon where eight T-34s were knocked out on the first day of their use. The 3.5in could penetrate 11 inches (27.9cm) of armor at zero degrees impact.

In August rifle platoon rocket gunners were sent to the rear to be trained and qualified on the new weapon by training teams accompanying the "three-point-fives" to Korea. The gunners quickly returned to their units with the launchers and basic loads of ammunition. All US Army and Marine units arriving from the States from August onwards were armed with the 3.5in before embarking. Units still retained some 2.36in bazookas for headquarters and support unit defense, but rifle platoons armed with the 3.5in and the remaining 2.36in bazookas were eventually replaced. Variants of the 3.5in used in Korea were the M20, M20B1, M20A1, and M20A1B1, the latter two adopted in 1952. The 3.5in was also issued to South Korean and UN units. At one point the US withdrew 3.5in bazookas from South Korean divisions replacing them with the 2.36in because they were losing so many and the captured weapons were being turned on UN tanks. The 2.36in was largely ineffective against the US M26 Pershing heavy tank, although they were relatively effective against the still numerous M4A3 Sherman medium tank. Additionally, the South Koreans seldom faced T-34 tanks. As the Koreans became more tactically competent and experienced, the 3.5in was reissued. In 1952 Communist China introduced a copy of the 3.5in M20, the 87mm Type 51, which saw use in the Korean War as well as limited use in Vietnam. It could fire US 3.5in HEAT and WP rounds.

FACT:

It is often heard that the 2.36in and sometimes 3.5in bazooka rockets ricocheted off German or Korean tanks hulls because the armor was so thick. The thickness of the armor had nothing to do with this; it means that the projectile failed to detonate. This was because the fuse was defective or the round struck the armor at a steep angle or the armor was sloped enough to deflect the projectile. They failed to detonate because the projectile did not strike at a zero–20 or so degree angle. The projectile lacked a graze capability allowing it to detonate if striking at a steeper angle. This occurs to varying degrees with most HEAT rockets, recoilless weapons, and rifle grenades.

Soviet hand grenade "ZERO-DELAY" fuse

The Soviet lever-delay "universal-fitting hand grenade fuse, modernized" (*Unifitsirovannyy Zapal Ruchnaya Granaty Modernizirovaiiyy*, UZRGM) was used in the F-1, RG-42, and RGD-5 (Chinese Type 59) hand grenades. The delay is 3.2 to 4.2 seconds. In 1983, an American "action adventure" magazine published an article stating the UZRGM fuse was provided with varied time delays ranging from 0 to 13 seconds at 1-second delay intervals. This misbegotten theory was based on a small stamped number found on the lower fuse body (concealed inside the grenade when inserted). This is not true. It fails to explain the actual 3.2- to 4.2-second standard delay for one thing, nor is there an external warning identification of "short" or "long" delay fuses when inserted in the grenade. It is absurd to think that there would be no form of identification and warning on grenade fuses set to detonate in less than three seconds. Additionally, they were randomly mixed in fuse packing cans without any delay markings (Soviet/Russian grenades and fuses are packed separately in the same wooden crate). While a zero-delay fuse is valuable for booby-trapping, it is curious what the value of 1- and 2-second delay fuses could be, much less any practical use of grenades with 6 to 13-second delays. A stretch of the imagination can think of some odd booby-trapping uses, but it makes no sense that such fuses would be commonly issued in all grenade crates in any numbers. All UZRGM fuses have the same delay time regardless of the stamped number. The number is believed to indicate only the factory production line.

This same article stated that US M200-series and Soviet UZRGM fuses are interchangeable. This author has attempted this with actual grenades. The Soviet fuse would only screw into the US fuse well about half way; enough where it was a tight fit and would function. However, US fuses would not screw into Soviet grenades at all.

This 0- to 13-second fuse delay myth was even included in a US Army manual, FM 3-23.30, *Hand Grenades and Pyrotechnics*, September 1, 2000 and the earlier FM 23-30, December 27, 1988, manuals known for their many flaws.

The US did in fact issue a zero-delay fuse for the Mk 2A1 "pineapple" fragmentation hand grenade late in World War II. The OSS requisitioned a quantity of Mk 2A1s with zero-delay fuses for use as booby traps with tripwire and securing tape packed in each container. The container and arming handle were secured with red tape warning of immediate detonation when the arming lever was released. A red metal tag on the pull ring offered the same warning. Some of these were used in Korea by UN partisan forces.

Is it true that RIFLE GRENADES could not be fired from the shoulder?

This is basically true owing to the bone-breaking, or at least bone-jarring, recoil of launching such a heavy projectile, but some lighter grenades can be fired from the shoulder. However, this statement is usually followed by, "They can only be fired at an angle with the rifle's butt on the ground." When firing long-range, indirect-fire antipersonnel grenades or screening smoke and aerial signal pyrotechnic signals (colored smoke and flares), the rifle was fired at a steep angle with its butt on the ground. Rifle grenades did need to be fired directly or horizontally though when launching antitank grenades or firing antipersonnel or white phosphorus grenades into firing ports, windows, and similar close-range point targets. This was accomplished by placing the rifle's butt stock *under* the arm, clamping it firmly against the torso with the arm, and being prepared for the rifle to recoil sharply upward. The shoulder did not take the recoil directly. Rubber slip-on recoil boots were issued with the grenade launchers by some armies, but were little used.

What was a ".60-caliber" machine gun?

This frequently crops up in the media but it's also seen in popular fiction writing as well as memoirs, especially of the Vietnam-era, and sometimes in online weapons forums and so forth. Sometimes it might be a typo and is meant to be .50-caliber, but most commonly it incorrectly refers to an M60 machine gun, which of course is 7.62mm (.308-caliber), hardly a .60-cal. A quick search of the Internet will turn up scores of references to ".60-caliber" machine guns when it is obvious that an M60 is being referred to.

It is not just the .60-cal, weapons calibers are frequently confused: "9-caliber" for 9mm and 22mm for .22-caliber are common examples. Even ".8-inch" naval guns were confused for the 8in, and of course there's the infamous "AK16 semi-automatic machine gun." When a reporter or fiction writer calls the M60 a ".60-caliber" it's a result of poor research and unfamiliarity with weapons. When a veteran does it, it's probably a simple "mind burp" or the guy could possibly be a phony. However, don't be too quick to jump to that conclusion because it is probably a simple mistake or a change inflicted by a well meaning, but unknowledgeable editor. It could also be confused by the fact that the South Vietnamese often called the .30-caliber M1919A6, .50-caliber M2, and 7.62mm M60 machine guns the "Number 30," "Number 50," and "Number 60," respectively, but few reporters or even veterans are aware of this slang practice unless they served alongside Vietnamese troops as advisors or in Special Forces.

FACT:
Actually, .60-caliber machine guns were tested by the Army Air Forces from late 1942 and the Air Force through the Korean War in a variety of experimental rotary and revolver aircraft machine guns. The .60-caliber T17 (15.2x114mm) used a cartridge case based on the 20x102mm (0.787in).* The first guns were based on the German Mauser 15mm MG.151 aircraft machine gun. Instead of the .60-caliber, the Air Force finally settled on the 20mm M61 (T171E3) Vulcan six-barrel rotary cannon as it offered more potent HE-I and AP-I projectiles than the .60-caliber's AP-I only rounds. Six North American F-86F Sabrejet fighters were armed with four .60-caliber T160 machine guns and underwent aerial combat trials. While they hit

over 22 enemy aircraft, none were downed, emphasizing the need for HE-I rounds. It was found that the four guns generated four times the muzzle gas as the standard six .50-caliber AN-M3 guns. In one instance the "puff" of burning muzzle gas entered a jet's air intake to snuff out the engine and the aircraft was lost. After that only two guns were permitted to be fired at a time above 35,000ft as the phenomenon only occurred at high altitudes. No .60-caliber machine guns were ever used in the ground role other than limited testing as a twin T63 antiaircraft version (no combat trials), being ruled out in 1951 as lacking the requisite 14,000ft slant range.

* The .60-caliber cartridge was actually developed in 1939 and tested in the tripod-mounted, semiautomatic T1E1 antitank rifle between 1942 and 1944. The 20x102mm cartridge was used in the M39-series aircraft cannons and the M61 Vulcan rotary cannon.

GATLING GUNS are often depicted as having been deployed during the American Civil War and countless Western movies. How widely were they used?

The hand-crank-operated, multiple-barrel Gatling gun was invented by Dr Richard J. Gatling (1818–1903)[72] in 1861 and patented in 1862. These heavy weapons were usually two-wheel carriage-mounted, although some smaller models had a tripod, and were employed more like direct-fire artillery pieces than modern machine guns. Calibers ranged from .30-cal to 1in. The guns were available in a variety of black powder calibers although smokeless powder cartridges began to be used in the early 1890s. The first model unsuccessfully used .58-caliber paper-cased muzzle-loading rifle cartridges. Most had six barrels, but later smaller caliber models had ten. Early guns fired 300–400rpm, but later models could reach 1,200 with improved gearing. The guns were gravity-fed by hoppers or open clips.

The donut-shaped Accles drum magazine seen in many movies was not available until 1883 and was highly prone to jamming. The much more effective Bruce feeder of 1881 was preferred. The US never widely used the Gatling in combat, but Britain and Russia made use of them in the 1880s as did other European armies, mainly employing them in their colonies.

The only Gatlings used during the Civil War were **privately purchased**, and they were expensive at about $1,500, an extortionate amount in the 1860s. General Benjamin Franklin Butler used two at Petersburg and mounted eight more on river gunboats. General Winfield Hancock employed 12 and Admiral David Porter used one on a gunboat. These were six-barrel .58-caliber paper cartridge M1862 guns. While seeing limited use, they proved effective and attracted a great deal of interest in the new weapon "worth a hundred riflemen."

The US Army did not formally adopt the Gatling until 1866, a year after the war. This was the M1865. Over the next 40 years the army used no fewer than 19 different models, many with just minor differences. The first models were 1in[73] and .50-70 Government, the latter being re-barreled to .45-70, the same round used in trapdoor Springfield rifles. The M1893 and later models were .30-40 Government as used in Krag rifles. The last model used by the US Army was the ten-barrel .30-40 M1900. These were converted to the M1903 by rechambering them for the short-lived .30-03 cartridge as the M1903 and then to the new .30-06. Gatlings saw limited use in the Spanish-American War and the Philippine Insurrection. The US Navy also made limited use of them aboard ships and for landing parties. The world's armies soon supplanted Gatlings with the Maxim gun (the first effective automatic machine gun developed in 1884) and other true machine guns. In an effort to prolong the life of the Gatling a battery-operated DC electric motor system was developed in 1893 firing 1,500 to 3,000rpm, but this only made the big weapon heavier and less mobile, to say nothing of the reliability problems of the era's batteries. The Gatling Company folded soon after the inventor's death. Colt produced the last Gatling gun for the army in 1911 and they were declared obsolete in 1915.

In fact, there was very little use of Gatlings during the Indian Wars even though the army possessed a few hundred. Over a dozen Western movies depict Gatling guns in the hands of the bad guys, however, there is no record of their use by civilians of the era.

FACT:
Lore has it that the 7th Cavalry Regiment's 1876 disaster at the Little Big Horn could have been averted if Lieutenant Colonel George Armstrong Custer (1839–76) had not ordered the two attached Gatling

guns left behind (thought to have been .50-70 M1866 or M1871 guns). Custer felt the heavy guns and their caissons would slow down his fast-moving column. His decision was based on the earlier experiences of Major Marcus Reno while on a scouting expedition; the guns slowed Reno's column on rough ground and one overturned injuring three soldiers. They were temporarily abandoned being retrieved on the patrol's return passage. There were also complaints of frequent jamming. Custer's dispersed column was struck by surprise from the flank as a mass of Indians charged over a raise. An estimated 1,200 Indians overwhelmed the 207 cavalrymen in a sudden rush. Many troopers fled in panic downhill afoot; there was no time to establish even a modicum of an organized defense and certainly not the last stand defensive perimeter so often portrayed in movies and on paintings. In reality, it is doubtful that events would have been any different if Custer had taken the Gatling guns.

The media and novices like to call the modern multi-barrel rotary automatic weapons like the 7.62mm M134 Minigun, 20mm M61 Vulcan, 25mm GAU-12/U Equalizer, .50-caliber GAU-19/A, 5.56mm XM214 Microgun, 30mm GAU-8/A Avenger, and Soviet Gryazev-Shipunov 23mm GSh-6-23 (9-A-768) "Gatling guns." These electrically-fired weapons (GSh-6-23 is an exception being gas-operated) spew out thousands of rounds per minute and cannot really be compared to the old hand-cranked guns. Any similarity is superficial – multiple rotating barrels.

The term though has become widely accepted as generic for any modern rotary machine gun. Technically though, actual hand-operated Gatling guns are not considered true full-automatic weapons and are not prohibited by ATF regulations.

Can the MINIGUN be fired in a portable handheld/backpack mode?

In reality, not easily.

In the movie *Predator* (1987)[74] future Michigan governor Jesse Ventura wielded a General Electric 7.62mm M134 electric-powered six-barrel

Minigun against a somewhat testy, but proficient extraterrestrial “game” hunter. While an impressive weapon, “Ol’ Painless” as it was nicknamed, ripping out a 3,000rpm or higher rate of fire, was a physical impossibility for several reasons. The first problem is the weight. Below is a list detailing what the gun and its components weigh:

Additional unspecified weight is necessary for the backpack frame and mounting adapter to allow it to be used as a handheld gun (an M60 machine gun forearm was used on this movie prop), say 10lb (4.5kg) together. The 500-round ammunition container with live ammunition would weigh almost 40lb (18.1kg).

Component	**Weight**
M134 machine gun	35lb (15.75kg)
Drive motor	8lb (3.6kg)
Feeder/delinker	10.16lb (4.57kg)
Gun control unit	4.16lb (1.87kg)
Gun drive gear housing	1.16lbs (0.52kg)
Cables	2.4lb (1.12kg)
Fed chute	2lb (1kg)

Only 500 rounds of 7.62mm linked ammunition could be carried, which would not have lasted nearly as long as depicted in the movie at 3,000rpm. Nor was anyone in the special ops team carrying additional ammunition for it; they carried their own arsenals.

The main problem with this fictional arrangement is that the 3.2-horsepower DC electric motor requires two 12-volt automobile batteries, which weigh approximately 40lb (18.1kg) together. US military ground vehicles and helicopters use a 24-volt electrical power system to operate the vehicle systems, radios, and other equipment.

This comes to a total of approximately 190lb (78kg), a rather heavy load for even “The Body” Ventura to leap and dodge about with over rugged terrain in mortal combat. Of course in the movie they did not bother with the 40lb of batteries and the really long extension cord was not apparent. While there are lighter 12-volt batteries available, it requires heavy duty

vehicle batteries to supply the necessary amps to power the weapon; 400 amps startup and 40 amps for continuous firing.

Other problems involve the recoil force, which at 3,000rpm is 150lb (67.5kg) of continuous recoil. Peak recoil can reach 300lb (135kg) making it difficult for even a he-man to control the weapon. Also, the centrifugal force of the barrel's high-speed spin makes it almost impossible to control in the handheld mode. It is said that just with blanks it was very difficult to keep the weapon oriented in even approximately the desired direction on the movie set. This fantasy weapon also appeared in *Terminator 2: Judgment Day* (1991) and was the same gun as used in *Predator*. An even more implausible cut-down, one-handheld "Minigun" was depicted in *Resident Evil: Apocalypse* (2004).

In 1970 General Electric did develop a 5.56mm six-barrel version called the XM214 Microgun and later a man-portable version called the GE Six-Pak. It was carried by a two-man crew and was not hand-fired, but mounted on the M122 tripod of the M60 machine gun or on a vehicle mount. It was fed by two 500-round ammunition cassettes and used a rechargeable 24-volt nickel-cadmium battery to power the 0.8-horsepower motor. It could be set to fire at a rate of 400–4,000rpm. The battery was depleted after firing approximately 3,000 rounds. The complete system with 1,000 rounds of ammunition, but without tripod, weighed 38.6lb (12.25kg). The tripod weighed 16lb (7.3kg). With the tripod and accessories it weighed 85lb (37.8kg). No armed force has adopted the XM214 or the Six-Pak. As a ground weapon it is too heavy and expends ammunition far too rapidly. The latter could be alleviated by firing at only the lowest rates, but then you are stuck with a machine gun providing the same capabilities as other machine guns, but weighing far more, requiring much more maintenance and cleaning, and having to rely on rechargeable batteries. As for using the XM214 as a vehicle- or helicopter-mounted gun, its 5.56mm caliber made it a much less effective weapon than its 7.62mm big brother, which is not all that much heavier.

Was the US M60 machine gun COPIED from the German MG.42?

Many like to say the US 7.62mm M60 machine gun was copied from the German 7.9mm MG.42. The M60 only used the much modified belt feed mechanism of the MG.42 and the operating mechanism of the 7.9mm FG.42 paratrooper automatic rifle (*Fallschirmjägergewehr*),[75] which itself borrowed features of the American Lewis machine gun. It can hardly be said that it is a "copy" of "Hitler's buzz saw" (not a German nickname).

SPECIFICATION:
MG.42

Caliber: 7.92 x 57mm
Feed: 50-round belt
Cyclical rate: 1,200rpm
Length: 48in (1,219mm)
Barrel length: 21in (533mm)
Rifling: 4 grooves, r/hand
Weight: 25.6lb (11.5kg)

However, in 1944 the US did in fact make a direct copy of the MG.42 in .30-caliber as the T24. This test weapon failed to work as engineers had not taken into account that the .30-caliber cartridge case is longer than the 7.9mm (63mm as opposed to 57mm). The bolt would not recoil enough to allow spent cases to be ejected. No effort was made to redesign the weapon to correct the problem and the project was dropped.

Two other test machine guns using MG.42 and FG.42 features were the .30-caliber T44 and T52 of the late 1940s and early 1950s. The latter evolved into the T161E3, which became the 7.62mm M60 in 1957. What can be said to have been copied from the German MG.34 and MG.42 was the "general-purpose" concept of employment. The M60 and the German weapons shared quick-change barrels and could be handheld or bipod-fired as light machine guns or fired from a tripod in the long-range, sustained-fire role (although the M60 was not optimized for this role as was the German gun with a heavier recoil-absorbing tripod and optical sight). The US did test the West German 7.62mm MG3E, a modified MG.42, in the mid-1970s

as a tank coaxial machine gun, but instead selected the Belgium FN MAG as the M240. The modern 7.62mm MG3 and its variants are used by over two dozen countries today.

Did "CARBINE" WILLIAMS truly invent the M1 carbine?

Legend has it that David M. "Carbine" Williams (1900–75) designed the M1 carbine while a North Carolina prison inmate after being convicted for murder of a law enforcement officer and for running moonshine; he was sentenced to 20–30 years. This myth was promoted by the motion picture *Carbine Williams* (1952) and magazine articles of the period. While in prison between 1921–29, Williams was allowed to work on the guards' weapons and he managed to design and develop the short-stroke gas piston and floating chamber principles. His sentence was reduced and he was released from prison, and then released from parole in 1931. He was not hired by Winchester until 1939.

Winchester was contracted by the army in May 1941 to develop what would become the M1 carbine, then called the "light rifle." Two Winchester engineers, William Roemer and Fred Humeston, quickly produced a prototype based on the .32 Winchester Self-loading Model 1905 semiautomatic rifle. Pleased with the prototype, the army gave the go-ahead for an improved design in August, and in October the new design was standardized. "Carbine" Williams' design, developed independently of other Winchester engineers, was not ready until December and was not adopted. His short-stroke piston gas action design that he had developed and patented in 1931 was used in the M1 carbine though, having been used in the Winchester Model 1905 self-loading rifle. "Carbine" Williams did not solely invent the M1 carbine as is so often implied or assumed. He was one of many contributing to its development.

Williams was also responsible for other weapons design features such as the floating chamber used in certain .22-caliber semiautomatic rifles and shotguns, and he developed an adapter to allow .22 Long Rifle ammunition to be fired in .30-caliber machine guns for lower cost training, but this system proved jam-prone and was replaced by Springfield Armory-designed machine gun trainers.

Did the SELECTIVE-FIRE M2 carbine see combat in World War II?

One often sees the .30-caliber M2 carbine being listed among weapons used in World War II. The original specification for the "light rifle," the developmental name for what would become the M1 carbine, was for a selective-fire capability, but this requirement was dropped during development. In May 1944 the T4 carbine was developed by Inland Division of General Motors with a selective-fire capability. Inland also developed the T17 modification kit to allow conversion of semiautomatic M1 carbines to M2 standards. Few were actually converted as it required modification by ordnance units and was too time consuming and work intensive. These kits were produced after the war, but were little used by the military. Besides a selector lever of the left side of the receiver, which required internal modifications to the stock (selector lever slot), other modifications included a different hammer and disconnector, trip lever switch, magazine hold-open capability for when the last round was fired, a strengthened magazine catch to adequately hold the heavier magazine, and curved 30-round "banana" magazines. Converted M1 carbine markings were sometimes over-stamped with "2." Many retained the M1 stamp though. The 15- and 30-round magazines were interchangeable among all carbine variants, although M1 carbines without the strengthened magazine catch could experience feed difficulties with 30-round magazines. Some M1 carbines were depot rebuilt as M2 carbines, but this was a complete overhaul to include the improved bolt and rear sight. No M1A1 folding stock carbines were converted to selective fire as is sometimes assumed, except possibly a very small number using T17 kits. M1A1s were removed from use after the war being replaced by the fixed-stock M2. The airborne no longer had a need for a folding stock weapon with the development of improved jump containers.

The M2 carbine was standardized on October 26, 1944 and all would be new production; no conversions from M1 carbines. Production did not commence until April 1945 by Inland and Winchester due to tooling up time. Besides selective fire other improvements were incorporated including a new rear sight, bolt, and stock. The first deliveries were made in May and then they had to be shipped overseas and distributed through logistics channels to units. The production of 30-round magazines was

delayed and they were not issued until November 1945. It is reported by ordnance repair units that a very small number of M2s were issued as replacements for damaged M1 carbines on Luzon at the very end of the war, but they were not accompanied by 30-round magazines.

For all practical purposes the M2 carbines did *not* see combat in World War II, although they would have been employed in the invasion of Japan.

That said, apparently the T3 carbine fitted with a first-generation T120 active infrared night vision scope ("snooperscope" or "sniperscope")[76] did see combat testing on Okinawa in mid-1945. This was a modified M2 selective-fire carbine, but these early T3s were apparently semiautomatic M1s. The T3 using an M2 carbine was later standardized as the M3 carbine and the improved T230 infrared sight as the M2. They were used in Korea, but only 1,200 were produced. The cone-shaped M3 (T23 Modified) flash hider was approved in September 1945 for the M3 carbine, but could be used on the M2 and was widely used during the Korean War.

The M2 carbine was less than an ideal selective-fire weapon as its cartridge was underpowered for all but close combat and its high 750–775rpm cyclic rate was unnecessary and quickly overheated the light barrel. In Vietnam reconnaissance teams sometimes cut the butt stock off M2s leaving the pistol grip, cut the barrel down to almost the forearm (losing the front sight), and removed the rear sight. This was used as an extraordinarily inaccurate "spray and pray" break-contact weapon.

The M2 carbine replaced the M1 and M1A1 carbines and most submachine guns, although M3A1 "grease guns" remained in use as "on-vehicle equipment" (OVE) aboard tanks and other AFVs into the 1990s. M2s saw extensive use in Korea and in Vietnam by Vietnamese regular armed forces, and security and paramilitary forces. M1 carbines also saw some use in Vietnam. In US service the M2 was replaced by the M14 rifle in 1957, but remained in use for a few more years. The last regular use of the M2 was by Air Force Security Police guarding Strategic Air Command (SAC) bases, but it began to be replaced by the XM16E1 rifle in 1962.

Were the M1 and M2 carbines the ONLY MILITARY WEAPONS CHAMBERING the .30 Carbine cartridge?

The .30 Carbine cartridge was used only in the various issue US carbine models, or so many think. This is true, unless one considers test weapons.

In January 1944 Smith & Wesson submitted a revolver chambered for the .30 Carbine to the Ordnance Department. It was based on its standard .38 Special Military and Police Model and retained six chambers even though the smaller carbine cartridge would have allowed for seven chambers, but this would have required much redesign work on an unsolicited trial weapon. The carbine cartridge is rimless, but it has a very slightly tapered case allowing it to be retained in revolver cylinder chambers. Tests showed the revolver was reasonably accurate, but it was very underpowered compared to the .45 ACP, had an uncomfortable muzzle blast, and hurt the ears of firers not wearing ear protection, which could not be practically worn in combat. The army rejected it stating it had no requirement for such a weapon even though the .30 Carbine had considerably more muzzle velocity and energy than the .38 Special, which was in use in S&W revolvers issued to the armed forces.

Later in 1944 consideration was given to a submachine gun chambered for the .30 Carbine, partly influenced by the German 7.9mm StG.44 assault rifle, but the resulting weapon was hardly comparable. Three .45-caliber M3E1 submachine guns (later to become the M3A1 “grease gun”) were redesigned and converted to .30 Carbine. Designated the T29, it had an absurdly high 1,500rpm rate of fire making it even more impractical; the .45-caliber M3A1 fired at a more reasonable 350–450rpm. The project was dropped with the standardization of the selective-fire M2 carbine, which eventually replaced most submachine guns in US Army and Marine Corps inventories except for those as AFV OVE, in which case the M3A1 was retained. There were a very few post-World War II sporting rifles and pistols made in this caliber, which was derived from the .32 Winchester Self-Loading cartridge of 1905. It was a round that never gained much popularity as a small game cartridge.

What was the “TANKER GARAND”?

This little oddity is also known as the “M1 tanker carbine.” There was a longstanding, and justifiable, complaint that the M1 carbine was too underpowered, lacked range, and had poor brush-busting capabilities. The

Ordnance Department was unsympathetic as the carbine was a self-defense weapon and not intended for frontline combat. In 1945 the Pacific Warfare Board directed a Sixth Army ordnance unit in the Philippines to modify 1,503 M1 rifles with shortened barrels. This was not an easy task as it required not only the barrel to be cut-down, but the gas cylinder, operating rod, operating spring, and forearm to be shortened and a new gas port bored in the barrel and mated to the gas cylinder. The idea was to provide a carbine-length weapon with the firepower of an M1 rifle, a true carbine. It did reduce its velocity and thus its range, energy, and penetration. While armor operations were not a significant aspect of Pacific Theater warfare, it was envisioned that tankers would use them along with other troops, hence the moniker "tanker carbine." Around 150 M1 rifles were converted and a sample was provided to the Ordnance Department in July 1945. Sixth Army requested 15,000 of the shortened rifles. In 1944 the Ordnance Department had developed a similar weapon, the M1E5 carbine with a folding pantographic stock, pistol grip, and shortened barrel for paratroopers. It had never progressed beyond the developmental stage as the standard M1 rifle could be broken down in two components to fit in jump containers. That negated the need for an additional special purpose rifle in the inventory with an uncomfortable and unbalanced stock. They replaced the M1E5's folding stock and pistol grip with a forearm-shortened standard stock and the short rifles were designated the T26. Testing showed the T26 possessed several problem areas. It generated excessive recoil, muzzle blast, and flash, and there were troubles with the shortened operating rod binding, operating spring failures, and excessive fouling because the gas port was closer to the chamber. Regardless, limited procurement for 15,000 T26 rifles was authorized and would have been delivered at the beginning of 1946. The project was cancelled after VJ-Day.

In the 1960s some firearms dealers created their own "tanker carbines" by modifying M1 rifles and marketed them as such making the term popular. The marketing campaign gave the impression that they were authentic army-modified weapons and that they were actually used in combat.

Did the M1 rifle's AUTOMATIC CLIP EJECTION endanger soldiers?

The .30-caliber Garand M1 rifle made a distinctive metallic “ping” sound when it automatically ejected the *en bloc* clip with the firing of the last of the eight rounds. The bolt locked open allowing the next clip to be quickly inserted. It was said that this ping alerted the enemy that a man’s rifle was empty and it would take several seconds for him to extract another clip from his cartridge belt and load it. Recruits were alarmed by this rumor and some writers brought this up as a “seriously dangerous design flaw.” There were recommendations to replace the *en bloc* clip with a detachable magazine. British writers especially seemed to seize on this apparent failing. There were war stories of enemy soldiers, upon hearing the ping, rushing the unfortunate soldier before he could reload. However, there are no known documented cases of this actually occurring. It is conceivable though, but if it occurred it was certainly extremely rare. The reality is that a soldier was seldom alone. Other squad members were locked and loaded. One would have to be awfully close to hear the ping in the shattering din of combat. The author’s experience with firing M1s in field exercises was that the ping was barely noticeable. There are other stories of US soldiers “fooling” the enemy into thinking they were empty by throwing an empty clip on the ground. The “ping” was caused by the ejection, not by the clip hitting the ground, which more often could not be heard unless on paving or a similar surface and that too was not very obvious.

Another imagined flaw of the M1 was that it could not be reloaded when partly empty. That is, when a soldier was behind that last bit of cover before the final rush and he had, say, only three rounds in the clip, he could not “top-off” the magazine as with a bolt-action rifle. What many do not realize is that a full or partially empty M1 clip could be ejected by opening the bolt, pressing the clip release lever on the left side of the receiver and the clip popped into one’s hand, whether full or with one round. Also, single cartridges could indeed be loaded into a partly empty clip while inserted in the magazine well. This was not a true “failing” or soldiers would have carried loose rounds for this purpose; they did not. Soldiers for generations had never bothered “topping off” stripper clip-loaded bolt-action rifles with loose rounds either. If an assaulting rifleman found himself with just a few rounds remaining in the clip, the common practice was for him to merely fire them off as rapid suppressive fire, reload in seconds, and close for the assault to “kill or capture the enemy” as the infantry mission statement says. This too was unsoundly criticized as wasteful of ammunition, but laying

down suppressive fire before bounding forward in the open is an imperative and suppressive fire is *not* a waste of ammunition.

What was the SMLE?

This was the **.303in Rifle, Short, Magazine, Lee Enfield, No. 1 Mk III** and similar marks (designated the Mk III only prior to 1926), which had a muzzle flush with the fore end of the stock. It was known as the SMLE (pronounced "smel") and the Tommy called it the "Smelly" or simply an "Enfield." The later No. 4 Mk I rifle's muzzle extended beyond the forearm and was not designated a "SMLE," although it is sometimes incorrectly called that.

It is usually claimed that SMLE means "short magazine Lee Enfield," but it means the rifle is short overall even though the comma is often deleted between the two words – "Rifle, Short Magazine" rather than "Rifle, Short, Magazine" (the latter being correct, but the former is seen even in official documents having become an almost traditional way of rendering the designation). Another abbreviation, found stamped on the rifles, is "S$^{\underline{HT}}$ L.E." for "Short Lee Enfield;" said to mean "Shitley" by those disliking the heavy rifle. It was called a "rifle, short" because earlier marks were longer in length and "short" had nothing to do with magazine length or capacity.

The SMLE provided a shorter rifle design, becoming popular after the turn of the century, providing a single weapon to eliminate the need for both long rifles and carbines. The SMLE and other Lee Enfields all had a "long" detachable ten-round box magazine protruding beneath the stock as opposed to internal five-round magazines used by most period bolt-action rifles. There was no "longer" magazine than the standard ten-round so it does not make sense for it to be called a "short magazine." "Magazine" was included in the designation simply to indicate that it had one, a "magazine rifle" as they were commonly called when introduced to differentiate them from single-shot long rifles. Some Lee Metford rifles and carbines, which the SMLE replaced, of the 1880s and 1890s had "shorter" six- or eight-round magazines, but they were not designated "short magazine," just simply "rifle, magazine, Lee Metford, Mk I," for example. They were "long rifles."

Additionally there was a rifle designated “rifle, charger loading, long, Lee Enfield, Mk I” adopted in 1907 by converting Lee Metfords, and it was indeed a long rifle compared to the SMLE.

SMLE is also said to mean “short muzzle Lee Enfield,” assuming that it referred to the muzzle being flush with the muzzle cap. This too is incorrect. It is also necessary to point out that it is “Lee Enfield” without a hyphen, which is sometimes incorrectly inserted.

The SMLE was adopted in 1907. It remained the standard Commonwealth rifle until the No. 4 Mk I was adopted in 1931 by Britain and later Canada. (They were also made by Savage Arms in the US for Lend-Lease and marked “U.S. PROPERTY.”) The SMLE remained in limited service with the British Army to supplement the No. 4 Mk I throughout World War II. Australia, New Zealand, and India continued to produce and use the No. 1 Mk III SMLE into the 1950s. Both the No. 1 Mk III and No. 4 Mk I are considered among the best bolt-action rifles ever developed.

As an aside, both of these rifles had a detachable ten-round magazine. This was the *only* magazine provided for each rifle. Riflemen did not carry a single spare magazine. They were loaded using two five-round charger clips. The magazine was simply detachable for cleaning.

Italian MANNLICHER-CARCANO rifle misconceptions

What are commonly called Mannlicher-Carcano rifles were used by the Royal Italian Army from the early 1890s to the end of World War II. “Mannlicher-Carcano” was mostly an American moniker. The 6.5x52mm Mod. 91 rifle actually used a modified Mauser Gew.88 action and was developed by Lieutenant Colonel Salvatore **Carcano**, an engineer at the Turin Arsenal. The action though was considered rather weak, one of the weakest of the era, but in spite of criticisms proved to be sufficient … barely. There were complaints that the bolt was stiff to operate and feed and ejection problems were common. Some claim it is among the fastest bolt-action rifles, which is questionable, however, it was fast-loading, gave a light recoil, and required only a light trigger pull.

The **“Mannlicher”** title came from the Mannlicher *en bloc* loading clip magazine and had nothing to do with the action itself. Most bolt-action

rifles of the era had a five-round magazine, but the Mannlicher-Carcano had a six-round loaded with an *en bloc* clip. There were complaints of the 6.5mm round's poor performance leading to it being called "The rifle that never gets angry because it has never intentionally hurt anybody." It was the first of many 6.5mm cartridges adopted by European armies in the 1890s.

In Italy the rifle was more commonly known as the "Mauser-Parravicino." General Gustavo Parravicino of the Infantry Shooting School headed the commission recommending the rifle's adoption. The Italian soldier simply called the Mod. 91 the *il novantuno* (the ninety-one) even though it was actually adopted in 1892. Mod. 91, Mod. 91/24, and Mod. 91/38 carbine versions also existed. Some types of carbines were additionally designated "TS" for *Truppe Speciali* (special troops; meaning artillery, engineers, cavalry, drivers, cyclists, paratroopers, police, and *Carabinieri* – Carabineers, national gendarmerie).

A shortened, modernized version, the Mod. 38 rifle, was introduced in 1938 in 7.35x51mm along with a Mod. 38 carbine of the same caliber. Because of the war the 7.35mm saw only a very short production run and in 1940 manufacture of 6.5mm weapons resumed. Italy wisely avoided a wartime caliber change. It is sometimes reported that the 7.35mm began replacing the 6.5mm during the war, but this did not occur. Some 7.35mm weapons were even re-barreled to 6.5mm, others were used in training, and many were sold to Finland who were desperate for rifles during the Continuation War. They too complained of its poor performance, especially in the extreme cold. The new 6.5mm rifle was the Mod. 38, shorter than the Mod. 91. In 1941 the 6.5mm Mod. 41 (aka "Mod. 91/41") rifle was introduced and had a longer barrel than the Mod. 38 rifle, but was still shorter than the original Mod. 91.

Some Mod. 91/38TS carbines were converted to German 7.9mm, some in 1941 and another batch in 1945. These have incorrectly been called the "Mod. 43." Those converted in 1945 were done so under German orders as, when Italy had surrendered in 1943, some Italian units continued to fight alongside the Germans. It is not known why a batch was converted in 1941, however, but perhaps it was to make use of German ammunition stocks in North Africa. It is reported that neither batch saw combat, although it is said, but not confirmed, that some were issued to the *Volkssturm* (Germany's last ditch militia).

The 7.9mm pushed the pressure limits the action could handle and users complained of excessive recoil. They did not require an *en bloc* clip, but were loaded by the standard German five-round charger clip. The Imperial Japanese Navy bought 60,000 of what were called Type I rifles in their own 6.5x50mmSR in 1939. They had a Mod. 91 action, but an Arisaka-Mauser-type five-round magazine, and Japanese-style barrel, sights, stock, and bayonet.

No Carcano sniper versions were made during World War II (there was a World War I telescoped sniper model). They did use "accuracy marked" (crossed rifle with a bulls eye stamped on the barrel at the receiver) rifles without telescopes. These were selected for their accuracy, one or two rifles out of 100. The 6.5mm Mod. 91/38 short rifle made in 1940 used in the 1963 President Kennedy assassination was fitted with an inexpensive Japanese-made 4x18 telescope by the US importer/distributor. The rifle's cost was US$12.78 including the telescope. This rifle was often incorrectly reported to have been a Mod. 38 carbine, but that model was 7.35mm. The Dallas Police Department originally reported it as being a "7.65mm Mauser" or an "Italian Mauser." (7.65x54mm Mauser rifles were used by Belgium, Argentina, and Turkey.) Whether the shots could have been successfully made considering the inadequacies of the Carcano has been long debated and will probably never be resolved to everyone's satisfaction.

What was a DERRINGER?

This category of handguns is described as the **smallest practical pistol** of a given caliber. They were single-shot, short-barreled pocket pistols intended to be carried in a gentleman's coat pocket or a lady's purse as a self-defense handgun. They were also popular among army officers as a back-up pistol. Since they were single-shot and none too accurate beyond 30ft (9.1m), they were often sold in matched pairs. The name is derived from the original maker of such handguns, Henry Deringer, Jr. (1786–1868) – note the single "r." He began producing fine quality pocket pistols in Philadelphia in 1852. The original pistols were marked "DERINGER/PHILADELA" and bore no model or serial numbers. The original Deringers were .38, .41, .43, .44, and .48-caliber, muzzle-loaded, rifled, cap-and-ball pistols. Numerous firms turned out similar designs and they were often marked "Derringer" with a

double “r.” The term “derringer” eventually became generic for this type of pocket pistol.

It is often thought that “Derringer” with the double “r” was a weak dodge to circumvent the Deringer name and mislead customers as to the pistol’s origins. The reality was that “Deringer” never held a patent on the design or a copyright on the trademark. Anyone could copy the design and use the name and many companies did, including Colt, Ballard, Marlin, Smith & Wesson, and Remington. His name was even misspelled with double “r” in catalogs and newspapers.

Deringer did not originate the concept of the small pocket pistol, they were being produced earlier, but he became known for improving their quality and large scale production. Break-open, breech-loading derringers were eventually made using .40, .41, and .44-caliber rimfire cartridges. There were also over-and-under double-barrel designs. In the early 1900s to the present, center-fire cartridge designs were made to include .32 ACP, 9mm Parabellum, and .38 Special plus .22 Long Rifle.

FACT:
The Lincoln assassination Deringer and related artifacts are on display in the Ford’s Theatre National Historical Site, Washington, DC. There is a myth that John Wilkes Booth’s Deringer used in the Lincoln assassination was substituted with a replica by burglars in the late 1960s. The FBI conducted a comprehensive investigation in 1997. The Deringer on display was exhaustively compared to close-up photographs taken in the 1930s, 1950s, and early 1960s along with precise measurements taken in those timeframes. The sharply defined photographs were of such detail that tool marks and the minutest details could be compared. It was determined that the Deringer presently on display is the same as that on display in the 1930s.

Another form of a similar pocket pistol was the “pepperbox” also known as the “pepper-pot.” They appeared in the 1820s and were popular through the 1860s when they began to disappear with modern revolvers taking over. These little multi-barrel pistols were an early form of revolver. They typically were of small caliber, had four barrels (occasionally more), and were muzzle-loaded cap-and-ball pocket pistols. Later they were chambered

for breech-loading rimfire cartridges. Unlike later “real” revolvers with a cylinder containing cartridges and a single barrel, the pepperbox had four or more barrels, each with a cap nipple, that were hand-rotated to align with the hammer for the next shot. There were rare models with up to 24 barrels. The grouped barrels, even with a small number, made them front heavy and difficult to aim. From the 1830s a pawl rotated the barrels when the weapon was cocked. A typical example would be the Sharps .32-caliber.

A modern day military “derringer” of sorts may be of interest. The Liberator pistol was developed in 1942 by the US Joint Psychological Warfare Committee with the idea of providing it to pro-Allied resistance movements. It was intended as a last resort self-defense or pointblank assassination weapon. It was envisioned that it could be used by walking up to a sentry or other lone enemy soldier, popping him, and acquiring a real weapon. Produced under the cover designation “flare projector 45” or FP-45, it was largely made of stampings with 23 parts. It had a 4in smoothbore barrel and was single-shot, firing a .45 ACP cartridge. The pistol was breech-loaded and the empty case was “ejected” by a supplied wooden dowel inserted in the muzzle. The cost of the “Woolworth gun,” made by Guide Lamp Division of General Motors, was US$1.73. It was issued with ten rounds of M1911 ball ammunition (five could be stowed in the butt trap), the wooden dowel extractor, and picture-illustrated (no wording) instructions in a waxed cardboard box. Half a million were produced in four weeks even though the armed forces had presented no requirement for it. It is estimated that 50,000 were sent to the Southwest Pacific Area and some were distributed to Filipino guerrillas and natives supporting Coastwatchers. The remaining 450,000 were turned over to the OSS. However, apparently none were issued to resistance groups in Europe as the respective governments in exile were concerned with the difficulties of what such large numbers of easily concealed weapons might cause after the war. Most were melted down or dumped at sea after the war. Since the FP-45 had no markings or serial numbers, those few encountered by US soldiers in the Philippines were assumed to be Japanese-made emergency pistols. A company has recently announced it would be offering an operational replica of the Liberator at immensely more than the cost of the originals.

Were Civil War-era revolvers CARTRIDGE-LOADED WEAPONS?

Revolvers came into wide use during the American Civil War arming cavalrymen, some light artillerymen, and officers. It was not uncommon for rank-and-file soldiers to purchase one of the many revolver makes available: Adams, Colt, Kerr, Lefaucheux, LeMatt, Remington, Savage, Smith & Wesson, Starr, and Whitney to name the most common makes. There was little standardization of calibers and cartridges with most makes having their own unique ammunition with common calibers being .31, .32, .36, .40, .44, .54, and .58. The army did settle on the .44-caliber and the navy on the .36-caliber, but some weapons of these calibers used different cartridges.

The modern "six-shooter" is thought of as a cartridge-loaded handgun, that is, self-contained cartridges with metallic cases containing the propellant, primer, and bullet. The cartridges are quickly loaded into the chambers through a loading gate one chamber at a time or by breaking open the action or swinging out the cylinder. This was not the case with 1840s through 1860s era revolvers, which were cap-and-ball or "caplock" weapons. About the only revolver available chambering metallic, internally primed cartridges was the French-made Lefaucheux using expensive 12mm (.44-caliber) pin-fire cartridges. The Smith & Wessons used rimfire cartridges. It was not until the late 1860s and early 1870s that metallic center-fire cartridges came into common use in revolvers.

The revolver was a new technology spreading rapidly from the late 1840s – Samuel Colt's (1814–62) .36-caliber (also .28-caliber) Paterson five-shot revolver was introduced in 1836. These were produced in Paterson, NJ and later Whitneyville, CT with assembly line advice given by Eli Whitney. Production was later moved to Hartford, CT. Further improvements were suggested by Texas Ranger Captain Samuel H. Walker (1817–47) during the Mexican–American War. Two of the most popular models used in the Civil War were the Colt .44-caliber Model 1860 Army and .36-caliber Model 1851 Navy.[77]

Most revolvers of the era used conical bullets held, glued, in a paper cartridge containing the black powder charge. Many revolvers used combustible cartridges rather than paper, which slightly sped up reloading.

These were made of nitrated paper, linen, or other materials. Cartridges were packed in six-round packets or whatever number the revolver held (there were four, five, six, seven, and nine-shot revolvers) with two or more packets carried in a belt cartridge box.

To load these weapons was a time-consuming process, which explains why many cavalrymen carried two or even three "horse pistols." Some even carried extra pre-loaded cylinders, which required the revolver to be partly disassembled to change cylinders, as this was much faster than reloading each chamber.[78] Since they usually fought dismounted this gave them considerable short-range firepower. The hammer was placed on half-cock and a cartridge removed from the cartridge pouch. If a paper cartridge, the bottom end was torn off with the teeth and the powder load poured into the chamber from the cylinder's front, a "front-loading" weapon. The rest of the paper was torn off by the teeth, spat out, the bullet inserted into the front end of the chamber, and pressed in with the thumb. The cylinder was rotated by hand to align the loaded chamber over the trigger. The loading lever under the barrel was grasped and pulled downward to ram the bullet solidly into the chamber and compress the powder ensuring positive combustion. This process was continued until all chambers were loaded. Next a percussion cap was removed from the cap pouch on the belt and pressed by the thumb onto the cone (or nipple) over each chamber (then called "charge holes") on the rear end of the cylinder. The cylinder was again rotated by hand until all nipples were capped. There was a partition between nipples to prevent the flash from igniting the other chambers. The piece was taken off half-cock and it was ready for action. It was smart to reload the guns every morning as lower night temperatures and dampness affected the powder and could cause misfires.

Combustible cartridges had the advantage that they did not have to be torn open, the powder poured in, and the remaining paper torn off. They were simply inserted into the chambers complete; but they still required ramming with the loading lever and hand-capping. It took skill to reload a revolver when mounted, even at a slow trot. It was impossible at a full gallop. It was also a challenge to keep loaded weapons' powder dry. The tiny hole through the cap cone fouled easily with black powder residue – the second most common cause for misfires – and a cone (or nipple) pick was carried in the cap pouch for frequent cleaning. Powder fouling was so bad that sometimes after a dozen or so shots the cylinder could not even be

rotated on some revolvers. Regardless of slow reloading, period revolvers provided soldiers with a means of rapid, short- ranged fire when most soldiers were armed with single-shot, muzzle-loading rifles of notoriously poor accuracy. Confederate Lieutenant General Nathan Bedford Forrest's (1821–77) cavalrymen carried multiple revolvers and often fought dismounted. One account tells of his dismounted troopers being able to see the boots on Union soldiers on the other side of a brush line. They opened up with rapid revolver fire shattering ankles. After the Civil War many caplock revolvers were converted to metallic cartridge-loading weapons.

Did the US Army ever use LEVER-ACTION RIFLES?

One often sees Western movies with "Yellow Legs" (cavalrymen) armed with some model of Winchester lever-action rifle, either Model 1873 rifles or Model 1892 carbines, which appeared after most of the Indian fighting had taken place. From 1873 to the turn of the century the US Army used .45-70 single-shot, trapdoor Springfields and prior to that from 1866 the .50-70 in trapdoor Springfields. The Old West frontier army was not armed with lever-action rifles. (The Old West era is generally defined as from the end of the Civil War to the turn of the century – 1865–1900.)

There actually was a lever-action rifle seeing extremely limited use by the army though, but well after Indian fighting was past. This was the Winchester M1895 rifle in .30-40 Krag. While a popular hunting rifle, the army version was fitted with a near full-length military-style stock, bayonet lug, and a box magazine rather than the usual tubular magazine found on most bolt-actions. Earlier Winchester lever-action rifles could not handle high-powered smokeless powder loads. John Browning developed the Model 1895's stronger action for calibers up to .405 Winchester (quite able to bring down any North American big game, for which it was designed). The army ordered 10,000 chambered for the standard .30-40 Krag cartridge in 1898 as bolt-action Krag production could not meet Spanish–American War demands. Only 100 were issued to the 33rd Volunteer Infantry Regiment in the Philippines in 1899 for field testing. With sufficient Krags available for the post-war army the Winchesters were returned to the States in 1900 and sold off to the civilian market. The main complaint of the military M1895 was that the magazine had to be loaded one round at a time

with the cartridge inserted vertically in the chamber centered on the magazine follower, rotated rearward, and slid into the magazine. This was far too slow. The remaining 9,900 were sold to the new Cuban Army in 1906. Civilian Model 1895 rifles and carbines were quite popular with the Texas and Arizona Rangers, Border Patrol, Pinkerton National Detective Agency, and many law officers from the turn of the century. It was a favorite rifle of Teddy Roosevelt and many other big game hunters. The Model ’95 was available in .30-40 Krag, .30-03, .30-06, .303 British, .35 Winchester, .38-72 Winchester, .40-72 Winchester, and .405 Winchester.

Russia purchased 300,000 Winchester military Model 1895 rifles in 7.62x54mmR in 1915 and by 1917 almost 200,000 had been delivered before a ban was placed on arms deliveries after the Russian Revolution broke out. The Russian model had charging clip guides allowing the magazine to be loaded using the standard Mosin-Nagant five-round charging clip, a feature the earlier US Army-acquired M1895s lacked. Some of these ended up being used by Finland during the 1918–19 Finnish Civil War and the 1939–40 Winter War, and the USSR provided many to Republican forces during the 1936–39 Spanish Civil War.

One other lever-action rifle did see limited US Army service. Owing to the severe shortage of rifles in 1917 the Ordnance Department ordered 1,800 Winchester Model 1894 carbines chambered for .30 Winchester Center Fire (aka .30-30 Winchester). These were purchased for use by the Signal Corps to arm guards in the Pacific Northwest (Washington and Oregon). They were to ensure there were no labor disruptions to spruce lumbering, a material essential to aircraft construction. The Aviation Section of the Signal Corps was then responsible for all aviation-related procurement. The Winchesters were delivered in early 1918. They were sold as surplus soon after the war and are considered collector’s pieces being known as “spruce guns,” although there’s no spruce in their woodwork. It is not uncommon for civilian rifles to be stamped with army markings and sold as fakes, but the serial numbers can be checked to verify if a weapon was actually Government Issue.

The US Army did make some use of a lever-action rifle even earlier. The Federal Government purchased only 1,500 .44-caliber Henry Model 1860 rifles early in the Civil War. The Chief of Ordnance was unimpressed by what was the most advanced rifle seeing wartime service. It was heavy when fully loaded with 15 rounds in its tubular magazine, the .44 Flat

Henry cartridge could not be used in any other weapon, the rifle and ammunition were expensive, and he saw no advantage over single-shot, breech-loading weapons such as the widely used Sharps carbine. Regardless, some 10,000 Henry "Yellow Boy" rifles were produced during the war and thousands were purchased by state-equipped units and individual soldiers for $40 (privates were paid $13 a month). A soldier impressed with its high magazine capacity said of it, "The rifle that can be loaded on Sunday and fired all week." A few cavalry units used Henrys and nine infantry regiments from Illinois and Indiana were armed with them, being purchased by those states. (See "What was the gun that won the West?")

Lever-action rifles are said to offer a slightly faster rate of fire when compared to military bolt-actions. The main drawback is that lever-action rifles are more difficult to operate when firing from the prone position, a common firing position of the era, and when firing over trench parapets. It noticeably reduced the rate of fire from such a position. The under-barrel tubular magazine used on most lever-action rifles was not conducive to pointed military bullets and had to be loaded one-round-at-a-time; no rapid-loading charger clips. Lever-action rifles are more susceptible to dirt and fouling and most could not deal with the increased chamber pressures generated by modern smokeless powder military cartridges. They were not as accurate at long ranges as bolt-action rifles and the available cartridges, being lower powered than most of the era's military cartridges, did not have the necessary long range then desired. Because most lever-actions ejected spent cartridges from the top of the receiver they could not mount telescopes, which was also a drawback for hunting rifles, although this was not much of a military consideration at the time. The Model 1895 had the reputation of generating a hard kick owing to its high-powered cartridges and the design of its shoulder stock.

Lever-action rifles did play a pivotal role in warfare, however, namely during the 1877–78 Russo–Turkish War. In 1877 the Ottoman Empire purchased 30,000 Winchester .44-40 Model 1873 lever-action rifles – "the gun that won the West." Intended to be issued to the cavalry, that branch had been largely disbanded and they were issued to the infantry defending Plevna (known today as Pleven in north-central Bulgaria) against the Russians. Each soldier was also armed with an American Peabody-Martini 11.43mm M1874 single-shot, breech-loading rifle, the standard Turkish

infantry arm. When the Russians attacked on July 30th the Turks opened fire with their Peabody-Martinis at up to 2,000 yards range cutting down the massed Russian formations as they ponderously marched toward the Turkish entrenchments. As the staggering densely packed Russians pressed forward, on command the Turks set aside the single-shot rifles and picked up their Winchester repeaters, for which each man had been supplied 600 rounds. At 200 yards the *Metmetçiks* opened up a deadly rapid and accurate fire; they had been drilled well. The Russians were mowed down in droves and the attack was utterly defeated. After reinforcement in September, the Russians made another attempt using the same headlong tactics and met the same fate. The Russians lost over 20,000 troops in the two attacks. While the bolt-action rifle would become the standard for military repeating rifles, the day of the single-shot rifle was over, but its demise was heralded by a lever-action rifle.

As a side note, repeating rifles were initially rejected by armies content with conventional single-shot rifles. During the Civil War, one of the first successful repeating rifles, the seven-shot, tubular magazine-fed, breech-loading .52-56 Spencer Model 1860 rifle, was first turned down at the beginning of the war with the reasoning that soldiers would fire too fast and waste ammunition. There were legitimate concerns about the logistic system's ability to keep mass armies supplied with ammunition if armed with such weapons. The development of metallic cartridges was still in its infancy, and they were slow and expensive to produce. Some 95,000 Spencer rifles and carbines were eventually issued to Union forces in late 1863 and proved very successful with a sustained rate of 20 rounds per minute (a muzzle-loader's rate was two or three rounds per minute). Owing to the inaccuracy of the era's muzzle-loaders and poor aiming techniques, the Union Army estimated that 900lb (408kg) of lead and 240lb (109kg) of powder were required to kill one Confederate soldier – 12,600 shots. Not calculated in the equation was the number of wounded, but there were generally three or four wounded per fatality. (A Union Springfield .58-caliber Model 1861 rifle fired a 500-grain minié ball propelled by an 85-grain black powder charge.) The Federal Government purchased 1,022,176,474 small arms cartridges and 1,220,555,435 percussion caps during the war. That does not count cartridges and caps purchased by state militias.

Were abandoned CIVIL WAR MUSKETS found loaded with multiple powder and bullet loads?

It is claimed that muskets were recovered from American Civil War battlefields with numerous charges of powder and balls loaded atop one another. In the excitement of combat inexperienced troops drilled by the numbers in loading procedures had failed to place a percussion cap on the nipple. It is possible that the cap may have been inserted, but had fallen off in some instances. They would pull the trigger, and with all the mind-numbing noise, anxiety, stress, and excitement, not notice that it hadn't discharged and would reload on top of the first charge, going through the automatic motions. Fortunately most did not remember to cap their musket at some later point, although this may sometimes have happened with grisly spectacular results.

Multiple-loaded muskets did indeed occur and with surprising frequency. After the 1863 battle of Gettysburg approximately 35,000 muskets were recovered from the battlefield by the Federals. These apparently were from both sides and probably more were from Confederate forces, who suffered the larger number of casualties and retreated from the field. Of these, 11,000 were unloaded and 24,000 loaded. Among the loaded muskets it was found that 6,000 held one charge, 12,000 held two, and 6,000 held three to ten charges. One held 22 charges. Besides anxious excitement and caps falling off, this may have been caused by drilling soldiers to load muskets by the numbers and not actually placing caps on the nipple during practice. That step could have been skipped or just simulated without actually opening the cap pouch and removing the tiny caps. Also, many double-loaded muskets may have been caused by caps simply falling off and then the soldier realized it was double-loaded when his ramrod did not fully seat when reloading. He would drop his musket and pick up another from a fallen comrade. It required a corkscrew-like bullet extractor fitted to a ramrod to extract misfired/unfired bullets, a time consuming process and not something that could be accomplished in the firing line.

Soldiers also sometimes loaded only a powder charge and failed to load the ball. When firing what essentially was a blank, which caused no discernable recoil, a soldier was said to have "shot his wad," which today refers to one who has blown his chance.

Was the *Man From U.N.C.L.E.* gun for real?

The multipurpose handgun carried by agents Han Solo and Illya Kuryakin in the 1964–68 *Man From U.N.C.L.E.* television series and nine spin-off movies was not a real weapon. It was based on the German Walther 9mm P.38 pistol, then somewhat of a modern looking design and not familiar to the average viewer. The P.38 was modified by replacing the grips with larger ones to change the profile (with telescope mounting bracket on the right grip) and the barrel cut down by about 2.5in (65mm) – half its original length, which meant the loss of the front sight normally fixed on the muzzle and no replacement sight was provided. Some modified actual wartime-issue P.38s were used when firing blanks, but the various add-on accessories were non-functional. Cast resin models were used in most takes.

The "MFU gun," or "The Gun," accessory kit provided a black leather shoulder holster rig, detachable tubular telescoping shoulder stock with a folding butt-plate, 7in barrel extension with a locking collar, sound suppressor (able to be fitted to the long and short barrels), birdcage muzzle compensator (for the short barrel), and an extended magazine to supplement the standard eight-round. With the telescopic sight, stock, barrel extension, and extended magazine fitted, the result was the "MFU special carbine." In the first few episodes the basis for the MFU gun was the Mauser 7.65mm (.32 ACP) Mod. 1934 pistol was used, but the producers felt it looked too small, especially with the attachments fitted. It was soon replaced by the P.38-based MFU gun.

Such a weapon would not have been practical in reality. The 2.5in barrel would have been terribly inaccurate, would have caused a loss of velocity and energy, and created a heavier recoil, report, and muzzle blast – the small birdcage compensator would not have helped much. The lack of a front sight would not have exactly aided accuracy. Aligning the rifling when locking on the barrel extension would have been difficult, if not impossible. Even if aligned it would have affected accuracy. Merely attaching the telescope without re-zeroing the weapon could not have provided accurate sight alignment. The extended magazine was made up from an actual eight-round magazine with a dummy attachment looking like a second magazine. If it had been a real double magazine, with the longer spring necessary it probably would have held about 14 rounds, not 16. The mockup silencer was far too small to have been functionally effective.

Besides standard ammunition, U.N.C.L.E. provided special dart-tipped rounds with a fast-acting tranquilizer.

Interestingly, in the late 1950s and early 1960s the CIA issued a silenced P.38 to some operatives. These were German-made World War II models issued in a case with a modified spare barrel, silencer (moderator), and subsonic ammunition. When used with the silencer the normal barrel was replaced by the modified barrel and the silencer screwed on the threaded muzzle. Like the MFU gun there was no front sight and the silencer, about three times larger than the MFU gun's, blocked the line of sight. The idea was that once used, obviously at close range, the silencer and threaded barrel could be discarded or hidden along with the special ammunition and the pistol with its standard barrel, common in post-war Europe, innocently retained. There was no forensic ballistic link (rifling marks on the bullet) between the silenced pistol and the inconspicuous "normal" pistol.

Some of the prop MFU guns were sold when the series was cancelled and are now expensive collector's pieces. Replicas have been produced, but appear much different than the originals. MFU toy guns were also made, themselves now collector's items. The comely U.N.C.L.E. headquarters secretaries carried Beretta .380 ACP Model 34 pistols in clip-on holsters on their skirt backs. These were made of resin as actual pistols were too heavy and dragged down their skirts. The T.H.R.U.S.H. (originally to be called W.A.S.P.[79]) bad guys usually used 9mm Luger pistols and .30-caliber M1 carbines with crude mockups of infrared spotlights and scopes copied from the M3 sniperscope carbine. (The producers said T.H.R.U.S.H. did not stand for anything, but in the spin-off *Man From U.N.C.L.E.* novels it was said to mean "Technological Hierarchy for the Removal of Undesirables and the Subjugation of Humanity.") During series development the U.N.C.L.E. acronym had no meaning either, but the writers were pressed to come up with one. Each episode's credit roll ended with, "We wish to thank the United Network Command for Law and Enforcement without whose assistance this program would not be possible." The United Nations protested about the U.N.C.L.E. title as they feared a connection would be made to that organization. In fact it was, with some people enquiring about spy job opportunities with the UN.

What was the TAKEDOWN SNIPER RIFLE that was seen in so many movies?

In the 1960s and 1970s, and perhaps even into the 1980s, there was often seen in movies a takedown, bolt-action sniper rifle in the hands of professional assassins and hit men. It would be carried in a case, which the sniper would open on a rooftop or in a sleazy hotel room, his perch for taking out the unsuspecting victim. He would snap the barrel into the action portion and attach the telescopic sight, then sinisterly load it. It used an interrupting thread locking system to mate the male barrel to the female action. It looked pretty slick; in reality it was a very rare weapon. The stock had been modified from the original to give it a more streamlined appearance.

What this was is the **Japanese Arisaka 7.7mm Type 2** (1942) paratrooper's rifle. This was a modification of the standard Type 99 (1939) short rifle used by the infantry. Takedown rifles were collectively known as "tara rifles." They were jumped in on the paratrooper either in a canvas chest bag, or with each half in two leg bags. These were lowered on a short rope after the parachute opened. An earlier version was developed in 1941/42, but the locking mechanism was inadequate, leading to the Type 2 being issued in May 1943.

Early Japanese parachute operations demonstrated that it was essential for the *Rakkasan Hei* (parachute soldier) to jump in with his primary weapon. The 8mm Type 94 pistols and three hand grenades they jumped in with were inadequate. They often had difficulties locating the separately dropped parachute containers with their primary weapons and ammunition. This forced them to attack with only pistols and grenades and search for enemy weapons. The first attempt to develop such a rifle was the 6.5mm Type 1 (1941) carbine. This was an Arisaka 6.5mm Meiji Type 38 (1905) carbine with a hinged folding stock, but was insufficiently robust leading to its rejection, plus a 7.7mm rifle was desired.

A means of modifying the standard Nambu 7.7mm Type 99 (1939) light machine gun, which already with a detachable quick-change barrel, was developed. It was provided with a detachable shoulder stock and folding steel pistol grip and came into use in 1943. The Imperial Japanese Army used few submachine guns, but they were provided to paratroopers in 1944

and may have been used in smaller numbers earlier. In 1942 the 8mm Type 100 (1940) submachine gun, a German Bergmann design, was modified with a hinged folding stock and a removable barrel. Paratroopers used these modified Type 100s, unmodified Type 100s, and the much altered 1944 version, which lacked a folding stock. Another standard infantry weapon modified for paratroopers was the 5cm Type 89 (1929) heavy grenade discharger ("knee mortar"). The standard discharger firing mechanism with its base plate could be unscrewed from the barrel and placed inside the barrel for compact carrying. The paratrooper version additionally had a detachable base plate.

In the 1980s these movie takedown rifles began to be replaced by more modern high-tech rifles as the Hollywood sniper's weapons of choice. The author suspects there may have been only one or two of the modified Japanese takedown rifles being rented out by a Hollywood prop gun supplier as a supporting role in all the movies it was featured in.

Why do some people hold pistols SIDEWAYS?

Because they see it in movies.[80] There is no practical value or advantage in holding a handgun – pistol or revolver – sideways, that is, a right-handed shooter turning it 90 degrees counterclockwise. Since it is seen in movies it is obviously "cool" and *must* have some practical value. It doesn't.

It has been suggested that in firing a pistol with the firing port oriented up and the case ejecting vertically it will be prone to "stove-piping," that is, the ejected case being caught in the ejection port and jamming the pistol. The force of gravity is insignificant on an empty case compared to the significantly more powerful force of ejection. Instances in which stove-piping has occurred were usually attributable to low quality ammunition, a defective weapon, and/or a weapon whose design is prone to stove-piping.

The main reason not to fire a weapon sideways, besides it looking amateurish, is that it makes aiming difficult and degrades accuracy.

Sometimes submachine guns are seen being fired sideways. It is claimed that the recoiling bolt aids pulling the gun sideways as it is swept horizontally. This may or may not be effective depending on the weapon's design and balance. However, most submachine gun bolt's recoil force is upward regardless of how the weapon is held.

Would the Davy Crockett weapon system's nuclear warhead detonation actually have killed the crew that fired it?[81]

The US Army employed the Davy Crockett atomic battle group delivery system from 1961–71. There were actually two Davy Crockett weapons, the 120mm M28 light and the 155mm M29 heavy launchers, adopted in 1958. These were muzzle-loading, recoilless weapons and rather difficult to categorize as there really is nothing else quite like them. They were not mortars as they were sometimes called, even though the crewmen carried the mortarman military occupation specialty. Nor were they recoilless rifles in the usual sense. They were mounted at different times on M38A1D and M151A1D ¼-ton utility trucks ("jeeps"), M274-series Mechanical Mule weapons carriers, and M113 armored personnel carriers. Both weapons could be ground-fired from a tripod or from the cargo beds of 2½-ton or 5-ton cargo trucks. An infantry battle group[82] had a platoon with two heavy and four light Davy Crocketts (although they were added just prior to the battle group being declared obsolete and the units were reorganized into battalions). The later mechanized infantry battalions could be augmented by a section with two Davy Crocketts – two heavy or two light or one of each. The concept was to provide infantry units with a tactical nuclear capability to engage massed Warsaw Pact armored formations and motorized rifle concentrations.

Both weapons fired the same 279mm (11in) XM388 projectile containing a W54 (aka Mk 54) nuclear warhead (there were also HE, M101 spotter, and practice rounds). The W54 warhead was also used in the Air Force's Falcon AIM-26 air-to-air guided missile intended to attack bomber formations. The 76lb (34.5kg) warhead was fitted on the end of a long detachable spigot rod or propelling piston of the appropriate caliber along with a propelling charge, and these were loaded into the muzzle. It was an implosion-type (fission-type) nuclear warhead and relied more on radiation than blast and thermal effects to inflict casualties. The nuclear yield was selectable ranging from the equivalent of 10 to 20 tons of TNT – "dial a yield." The 10-ton blast effect was about three times more powerful than the 1995 Oklahoma City 7,000lb ammonium nitrate bomb. The weapons had a relatively short-range, the M28 light reached 1.24 miles (2km) and the M29 heavy 2.5 miles (4km).[83] If fired at its minimum range of 400yd

(360m) – it required that minimum to arm – the crew would obviously be within the lethal radiation radius, but doctrine called for it to be fired to as long a range as possible. This short-range capability was reserved for HE rounds. The first live firing of an M29 with a nuclear warhead (set equivalent to 18 tons of TNT) was on July 17, 1962 by a five-man crew from an M113 APC (static test nuclear warhead detonations were first conducted in 1958). It was fired to a range of 1.7 miles (2.7km) to detonate 40ft (12m) above the ground. The crew was not atomized, incinerated, irradiated, or sunburned. A group of almost 400 spectators observed the detonation some 2 miles (3.2km) away from ground zero and included Chairman of the Joint Chiefs of Staff General Maxwell Taylor and Attorney General Robert F. Kennedy.

While the weapons were too short-ranged to safely engage targets beyond the effective range of mortars and other weapons employed by Soviet tank and motorized rifle regiments, the four-man crew, with even the highest yield setting, was outside the radiation, blast, thermal, and debris hazard radius. The minimum safe firing range was 1km for the maximum yield setting. Even the 20-ton yield setting would physically destroy only an approximately four-block area. Anyone about a half-mile from the detonation was spared most radiation effects. The radiation dosage within 150m was instantly lethal and at 400m probably lethal, certainly beyond the range it was launched at targets. The crew did have to be dug in, preferably with overhead cover, and would then immediately withdraw from the firing point after the detonation in order to avoid radioactive dust and enemy counterbattery fire. The crew would feel the concussion, but without injury. They would routinely undergo nuclear decontamination and subsequent radiation monitoring as a precaution. Mounting the weapon on an M113 APC was an effort to provide more crew protection from enemy fire and better mobility, especially to allow them to withdraw quickly immediately after firing.

The weapons proved to be rather inaccurate, being severely affected by crosswinds, further making them much less effective when using the lower yield settings. The M29 heavy launcher was provided with a 37mm spotting gun while the M28 light launcher used a 20mm spotting gun to adjust the range, but the large, slow, fin-stabilized primary projectiles were easily affected by crosswinds.

Another problem was that the muzzle and back blast firing overpressure were so great that the crew had to be some distance from the weapon and under cover when it fired, which was necessary anyway for protection from enemy fire and possible detonation effects. Remote firing was accomplished via an electrical firing cable. It was a misunderstanding of what this hazardous back blast overpressure zone around the weapon was, that led to the myth that the crew was within the warhead detonation radius. There is little argument that the Davy Crockett was a poorly conceived weapon system, **but no, it did not kill its crew**. The last units armed with the Davy Crockett were the 55th and 56th Infantry Platoons (Davy Crockett), 82nd Airborne Division Artillery, which were inactivated in 1968.

Other shortfalls with the weapons' design were that they could not be guided in flight, inactivated, or ordered to destruct once launched, violating the normal nuclear weapon "fail-safe" policy. It was phased out and replaced by the Lance MGM-52 missile (fielded in 1972, variable-yield 1- to 100-kiloton warhead). By that time additional longer ranged and more accurate 155mm M45 and 8in (203mm) M442 howitzer nuclear rounds were available, fielded in 1963 and 1957, respectively (which too still lacked a fail-safe capability). The US unilaterally withdrew nuclear artillery projectiles in 1991 and Russia did the same the following year. The US nuke projectiles were dismantled by 2003.

Were there really plans for NUCLEAR HAND GRENADES and LAND MINES?

One can assume that in the 1950s a nuclear hand grenade might have been suggested within some research and development organization in the early days of over-enthusiasm for atomic weapons. It is pretty doubtful that it was seriously considered much less studied. A nuclear weapon can be made only so small. The smallest in the US inventory was the 155mm M45 artillery-fired atomic projectile (AFAP) for the M109-series self-propelled and M114A1 and M198 towed howitzers. It was 6.1in (15.5cm) in diameter, 33.3in (33.8cm) long, and weighed 127.86lb (56kg). Its W48 nuclear warhead, introduced in 1963, had a yield equivalent to 72 tons of TNT.

There were man-packed nuclear devices intended to be clandestinely infiltrated by Special Forces teams and precisely emplaced to destroy

critical targets such as bridges, tunnels, airfields, seaports, elevated highway intersections, lines of communications, check points, etc. The Davy Crockett's W54 warhead was also used in the 72lb (32.6kg) man-packed 0.01- to 1-kiloton selectable yield Special Atomic Demolition Munition (SADM – pronounced "say-dem") – "backpack nuke." It was in service from 1965 to 1989. The Medium Atomic Demolition Munition (MADM – pronounced "ma-dem") with a W45 nuclear device weighing 181lb (82kg) and was in service from 1964 to 1986. It had a selectable yield of 1- to 15-kilotons. In effect the SADM and MADM were "nuclear landmines" to be pre-emplaced beside high-speed avenues of approach (see below for the employment of "nuclear landmines"). They were either command-detonated or detonated by a timer. These were sometimes referred to as "suitcase nukes," "backpack nukes," or "nuclear hand grenades," the latter facetiously. They could be man-packed; including attached to parachutists, and were broken down into smaller components. They were also provided with a small two-wheel handcart for transport, but these could seldom be used cross-country.

All in all the suggestion of a nuke hand grenade is more of a joke or gag than anything else. If it were physically possible, it would be fatal to the grenadier, no matter how well developed his throwing arm. Even if it were not fatal to the grenadier, what would be the realistic point of it?

There were actually plans for a "nuclear landmine." In 1954 the British developed and planned to construct ten Blue Peacock 10-kiloton yield mines that were to be secretly stored in West Germany. During development the project was known as Big Bertha and then Brown Bunny. In the event of a Soviet invasion these mines would be buried or submerged at highspeed avenues of approach, choke-points, and major bridges. The 7.2-ton atomic demolition munition had to be emplaced using a transport truck and mobile crane. It could be detonated via an up to 5km firing cable or by an up to eight-day timer clock. If tampered with once armed they would detonate in 10 seconds. They were approved for deployment in 1957, but after reconsidering the fear of them falling into Soviet hands once emplaced, concern that they might not function in severe cold, the radioactive fallout that would be inflicted on an allied nation, and that secreting them in West Germany without that government's knowledge was politically flawed, the project was cancelled in 1958.

Because of the fear that the Blue Peacock might fail in extreme cold, the idea of the addition of a "house" inside in which a few chickens with a week's supply of food and water would be placed when the "landmine" was emplaced was considered. The chickens' body heat would be sufficient to keep the timer and firing mechanism comfortably warm. The "landmines" would also be wrapped in fiberglass insulation. The consideration of using chickens is not a myth, but it is believed it was proposed as an option if no other adequate heating means could be found. As such, the Blue Peacock has been referred to as the "chicken-powered nuclear bomb."

Is it true that FLAMETHROWERS frequently blew up, immolating the operator?

Contrary to popular misconception, and what is so often shown in movies, flamethrowers seldom if ever explode if hit by gunfire or shell fragments. (As an aside, flamethrowers used in movies are propane-filled for safety reasons and do not replicate the same effect as gasoline-based flame fuels.) The same applies to a gasoline can or vehicle fuel tank. The liquid fuel does not ignite, it is the vapors that ignite. Even a partly filled tank is difficult to ignite. To operate a flamethrower the smaller compressed propellant tank is pressurized and a valve is turned to pressurize the fuel tanks. The propellant gas is either nitrogen (N) or carbon dioxide (CO_2), which are nonflammable and displace fuel vapors, that is, return it to a liquid state. The pressure is not all that high and if the tank is penetrated the non-flammable propellant gas will simply vent or the fuel leaks out. The fuel and propellant actually suppress sparks and bullets and are not hot enough to ignite the fuel. The author has never found a documented incident in which a flamethrower exploded when hit by gunfire. It has been found that when firing multiple tracer rounds into pressurized propane tanks they failed to ignite the tank. Multiple armor-piercing-incendiary rounds fired from an automatic weapon would ignite the tank, however.

The main danger to flame-gunners, or flamethrower operators as they are often called, was the fact they were readily identifiable by their burden and forced to move slowly owing to the typical 75lb (34kg) weight. They would of course immediately have been targeted by every weapon that could be brought to bear. It is said that captured flame-gunners could expect ill-

treatment or a quick or maybe not so quick *coup de grâce.* Again, there are no documented cases, but it may well be true in the rare instances where an unfortunate operator fell into enemy hands. Lore also claims that flame-gunners were given fake military occupation specialty numbers so they could not be identified as such. This is not true and besides, soldiers and marines carried nothing in combat that identified their specialty (it is not indicated on dog tags or ID cards), not that enemy troops would know what the codes were. The Army had no specialty code for flamethrower operators, although the Marines did to an extent. Flamethrower operation was merely an additional skill taught to selected engineers or infantrymen.[84] Physical fatigue and heat exhaustion were hazards as were leg and back injuries inflicted while attempting to move rapidly over rough terrain and avoiding gunfire with such a load. The gunner was forced to move in relatively close to the target, often much closer than the advertised effective range. Typical official ranges were about 50 meters with thickened fuel. Most countries used only unthickened fuel with much shorter range, more like 20–30 meters. It must be pointed out that many flamethrowers could not use thickened fuel as they had to be built to handle such fuels (see box below). A great deal of fuel was wasted as it was consumed in the long stream of burning fuel and they had to move in closer to stream the fuel into small openings. There is some danger of burning fuel being blown back on the gunner by high wind gusts or the detonation of munitions inside the target structure. (See "Who dreamed up the flamethrower?")

FACT:
Just what was thickened fuel? A powdered additive was mixed with gasoline or diesel fuel to create a thick syrupy substance. M1 thickener was composed of aluminum naphtenate, aluminum oleate, and aluminum laurate. M2 thickener added an anti-caking agent. M3 thickener was disalicylidene-1 and 2-diamino propane). M4 thickener was made of hydroxyl aluminum. As a substitute, in World War II the Marines used navy bunker C fuel oil and diesel or straight bunker C fuel oil. Bunker C (aka No. 6) heavy fuel oil has the highest viscosity (thickness) of the six grades of ship fuel oil. The Germans used a light oil, *Flammöl Nr. 19.*

Was the final protective fire of an 8in HOWITZER accomplished by direct-firing just a propellant charge?

In Vietnam it was claimed there was no flechette round for the 8in (203mm) M110 (T236) self-propelled howitzer, the most accurate artillery piece in the US inventory. The story was that if facing a ground attack a propellant bag without a projectile was loaded and the howitzer was fired pointblank at the attacking enemies of democracy. The same was said of the 175mm (6.8in) M107 (T235) self-propelled gun – the longest ranged US land artillery piece (19 miles; 32km), but the least accurate. This was said to result in a massive incinerating fireball blasted into the faces of the briefly distressed enemy.

There was no such prescribed technique. It would not work. Unconfined by a projectile, the propellant charge would not develop sufficient pressure and would burn in a few seconds in a relatively weak flame emerging only a few meters from the muzzle. It did not detonate as such and there would be no overwhelming fireball muzzle blast. The reason there were no 8in, 175mm, and 155mm artillery flechette rounds is that there simply was no requirement for such large flechette projectiles. It was impractical and smaller caliber flechette-firing weapons were available for perimeter defense (90mm and 106mm recoilless rifles; 90mm, 105mm (not used in Vietnam), and 152mm tank guns; and 105mm howitzers). Flechette rounds were officially called “antipersonnel-tracer” (APERS-T) and unofficially known as “beehive” rounds.

As an aside, the 175mm M107 gun’s and 8in M110 howitzer’s self-propelled chassis, mounts, and cradles were identical. The barrels could be switched in a relatively short time, about two hours. In Vietnam, from late 1967, the battalions of 12 tubes (three four-tube batteries) were “dual-roled” and could have a varied mix of 8in and 175mm pieces and sometimes changed the mix depending on fire mission requirements.

Is it true that servicemen returning from VIETNAM routinely SMUGGLED or legally brought back AUTOMATIC WEAPONS?

Some soldiers and Marines may have managed to smuggle back illegal weapons, but it was rather difficult. Duffle bags, sea bags, and other baggage were inspected by military police before boarding the "Freedom Bird" flying them back to the "real world" and they were again searched by US Customs officers at the Stateside port of entry. Military personnel were, however, authorized to bring home a single trophy weapon.[85] A request form had to be submitted and the weapon cleared by the unit S2 (intelligence staff). Weapons must have been in compliance with the ATF's National Firearms Act of 1934, which restricts automatic weapons and "destructive devices." Weapons capable of full-automatic fire or projecting high-explosive projectiles were prohibited and this included AK-type assault rifles. Any form of explosive munitions or devices and live ammunition were also prohibited. It was even difficult to bring back completely inert ordnance devices such as hand grenades that had had their explosives, detonator, and delay train removed. US and allied weapons recaptured from the enemy had to be turned in with the exception of .30-caliber M1903A3 Springfield rifles (which had been issued to Montaganard village self-defense forces) and .30-caliber M1 carbines with four-digit or lower serial numbers (quite a collector's find). Basically the only weapons that could be brought back were Soviet/Chinese-made semiautomatic rifles like the 7.62mm Simonov SKS carbine (Chinese Type 56), bolt-action rifles such as the 7.62mm Mosin-Nagant M1944 carbine (Chinese Type 53), and semiautomatic pistols like the 7.62mm Tokarav TT-33 (Chinese Type 51), probably the three most common weapons brought back as war trophies from Vietnam.

In later conflicts including Grenada, Panama, the Gulf War, Bosnia, Kosovo, Somalia, Iraq, and Afghanistan, trophy weapons and munitions were prohibited owing to the large numbers of automatic weapons and the rightful controversy raised by antigun groups. There have been incidents in which servicemen were arrested for attempting to smuggle in unauthorized weapons and ordnance items. These were sometimes found concealed in returning unit vehicles and shipping containers and it could not be determined who had hidden them away.

How deep UNDERWATER does one have to dive to be protected from bullet hits?

We often see surface or underwater scenes in movies of individuals being shot at from above as they dive under to escape the fire. How deep one must dive to be protected from gunfire depends on several factors including the caliber, bullet weight, velocity of the round, distance from the weapon to the water, angle of impact, and even the profile of the bullet (round-nose or pointed, for example). Test firing has shown that the larger the caliber and higher the velocity the bullet is, the less depth it will be lethal at. For example, .30-06 (fired from a Garand M1 rifle) and .50- caliber (fired from a Barrett M85A1 anti-materiel rifle) bullets often fragmented upon striking the water's surface. If striking the water at a low enough angle the bullets will ricochet. A 9mm bullet and similar rounds, being much lower velocity, can be lethal to as deep as 8ft (2.4m).

Again though, there are a great many variables. If forced to dive into water to escape someone with evil intent and armed with a submachine gun or pistol, once in the water, turn and swim *toward* the shooter or perpendicular to the line of fire as the bullets will continue through the water at approximately the angle they enter it. Swimming away from the shooter keeps one in the path of the slanting bullet tracks longer. However, they will curve to roughly a horizontal angle in different directions (in the line of fire or at different angles to the sides – bullets in the same burst will curve off in different directions), but at that point they have lost much of their lethality.

Can small arms really be FIRED UNDERWATER?

Motion pictures have depicted handguns being fired underwater at close range. Does this work?

First off, contrary to perceptions, **the barrel must be** *completely* **filled with water**. Air pockets could result in the barrel splitting or exploding or otherwise damaging the weapon. A bullet fired underwater will travel a shorter distance than one fired into the water from above the surface as the latter has a "head start" through the air, plus it does not have to displace the column of water filling the barrel. In underwater firing tests it was determined that 9mm pistols and .357 Magnum revolvers were lethal within 3ft (0.9m). The spent bullet might travel 16–18ft (4.8–5.4m) though. A .30-06 M1 rifle fired underwater resulted in the bullet traveling only 2ft. The

longer the barrel, the shorter the distance the bullet will travel. The column of water in the long barrel greatly reduced the bullet velocity and muzzle energy. The bullet has to push the water column out of the barrel. A 12-gauge shotgun fired underwater split the barrel and the shot traveled no effective distance. The long, large bore barrel contained a significant amount of water volume, sufficient to burst the thin barrel (shotgun barrels are proportionally thinner than rifle barrels). This is a case where the shorter the barrel, the more effective the weapon. The bullet has to dispel less water (mass) out of the barrel. By the way, water in the barrel of a weapon will *not* normally cause it to explode; mud, dirt, sand, and other blockages can though. Smaller caliber rifles are more prone to explode or split the barrel because it is more difficult for the water to drain or be blown out. Water retention in the bore is especially a problem of approximately .25-caliber (6.5mm) and smaller caliber weapons, which of course includes 5.56mm. Always take precautions to properly clear the barrel if your weapon is immersed.

How effective are SHOTGUNS in combat?

Pump-action or (semi-)automatic shotguns, especially with 20in barrels and loaded with buckshot, have a certain appeal for use in close combat situations. However, while the use of shotguns is beneficial in some situations, they have their limitations. The purpose of this discussion is not to belittle the value of shotguns or lay fault on their shortcomings, but to provide a complete understanding of their capabilities and limitations. Shotguns do possess certain limitations, as does any weapon, and these must be understood in order to make maximum effective use of the weapon and prevent them from being used in inappropriate situations. The problem of understanding a shotgun's limitations is that there are so many misconceptions and myths associated with the weapon.

The standard US 12-gauge combat load is the 2¾in (70mm) shell with nine 00 buckshot pellets (.33-caliber, 1,325ft/sec, 3ft from muzzle). The 3in (76mm) magnum shell has 12 00 buckshot pellets. The 12-gauge magnum cannot be used in all shotguns though. Besides smaller sizes of buckshot and birdshot, there are also a great many specialized combat shotgun rounds including solid slugs, armor-piercing, high-explosive, fragmentation,

lock/hinge busting, barricade-breaching, tear gas, flechette, non-lethal riot plastic shot and rubber bullets, etc.

Some models of pump-action shotguns may be fired by retaining pressure on the trigger as the action is pumped and it will fire "automatically" after the round is chambered and the slide shoved forward. In World War II shotguns capable of this sometimes had the trigger wired down. One would have to check and see which models of shotguns this is applicable to. A round *cannot* be carried in the chamber when the trigger is wired back.

Much of the conventional wisdom regarding the use of shotguns is based on some basic misconceptions. The first problem with a shotgun is that while it is impressive to rapidly pump six or so rounds of buckshot into underbrush, one then has to reload it, while fumbling around in an ammunition pouch for each shell, one-round-at-a-time. It not like ejecting a spent magazine and slapping in a fresh one. This is a serious drawback.

One of the main misconceptions of shotguns is that they are viewed as scatter guns, "room brooms," i.e., one merely points it in the general direction of the target and fires assured that one will hit everyone downrange. This is not true. Even with the cylinder choke – the tightest pattern – the shot dispersion at under 30 yards is not all that much. All of the pellets will strike within a 3ft circle. At 40yd, however, the shot begins to spread widely. Shot spreads approximately 1in per yard. This means vertically as well as horizontally resulting in less of a chance of the nine pellets hitting other individuals near the intended target, i.e., some will go overhead, others will hit the ground, and others go wide. Only three or four of the pellets will hit within a 1-yard circle at 40yd meaning two or three .33-caliber lead pellets may hit a man-sized target. They are about as potent as a .32 ACP pistol bullet.

It is often thought that firing two or three shotgun shells into a room will take out everyone inside. This too is not true. The shot spread at such short ranges is not enough to cover anything but a small portion of the room. Firing across a 15ft wide room, the size of a large bedroom, will see a spread of less than a foot – not exactly "cleaning out the room with a scattergun."

In Malaysia the British found that No. 1 buckshot was more effective as more pellets were liable to hit a man-sized target. It was deemed that a larger number of slightly smaller pellets hitting a target was more effective

than fewer large pellets. Smaller pellets, however, have less retained energy and less penetration than 00 buckshot out to 30–50 yards plus are less effective penetrating through brush. For ranges under 40 yards, 0 buckshot (.32-caliber, 12 pellets per shell) and No. 1 buckshot (.30-caliber, 16 pellets per shell) might be more effective than 00 buckshot with just nine. For close-in self-defense, under 20 yards, No. 4 buckshot (.24-caliber, 27 pellets per shell) is considered effective due to the large number of multiple hits on a person at short ranges and the shot will penetrate through fewer interior walls. In Malaysia during the 1948–60 "Emergency" the British used a special load ("Malaysia load") of 00 buckshot over birdshot.[86] The buckshot busted through brush with the light birdshot following along to inflict minor wounds which, if not incapacitating, caused bleeding to allow trackers to follow the wounded terrorist. This is similar to the "buck and ball" shot used in muskets during the American Revolution through the Civil War. Standard musket loads were one full-caliber ball (typically .69-caliber) and three smaller buckshot (usually about 00 size – .33-caliber) loaded together in a paper cartridge with the buckshot ahead of the ball so the ball would act as a gas seal of sorts. The shot spread was considerable, beyond 50yd, and at over 100yd (90m) very inaccurate. At 200yd (180m) buck and ball had lost much of its energy and became comparatively ineffective.

Shotguns lack effective penetration at ranges over 40yd, which is considered the maximum effective range with 00 buckshot for downing a deer or man. Any range over that will not cause "instant incapacitation." Comparatively soft lead spherical shot simply do not achieve nearly the penetration of higher velocity, ballistically-shaped, jacketed bullets. This means that shotguns may fail to penetrate 1in thick planks, ¾in plywood, heavy solid-core wooden doors, and similar materials at even moderate ranges. The pellets deform and expand when hitting hard materials and this further reduces their penetration. Most body armor will defeat buckshot at even close range. Buckshot at longer ranges, while hitting a person and possibly incapacitating him, may not be lethal as the pellets will not penetrate the body deep enough to damage internal organs and arteries. Shotguns will do little damage to automobiles beyond very close range, other than superficial. The buckshot may penetrate the outer body of a car, but will not always penetrate inner panels, seatbacks, etc. Buckshot often fails to penetrate windshields except at very close range. It will shatter and

penetrate most side and rear safety glass windows though, but still may require multiple rounds.

Shotguns are of course effective in close combat situations, especially in MOUT (military operations on urbanized terrain), fortification clearing, tunnels, caves, storm sewers, night patrols in close terrain, bar fights, bank jobs, etc. Ear protection is required in confined areas and the massive muzzle flash at night or in dark, confined areas will dazzle the firer as well as everyone else. Shotguns are very effective for blowing off door hinges and locks (attack the hinges rather than locks as they are generally weaker than locks), blasting out windows, and shooting through light wall materials (sheet rock, plaster and lathing, etc.). Remember that shot will ricochet at such close ranges. It will go through a sheetrock wall, but some shot may ricochet off 2x4in studs. Buckshot is usually not too effective for shooting through floors and ceilings because of the multiple layers of flooring, sub-floors, floor coverings (rugs, carpets, tile, vinyl, etc.), joists, and ceiling material, but rifled slugs may have more effective penetration.

Rifled slugs are very effective for blowing off hinges and locks. A typical 12-gauge Foster-type lead rifled slug weighs about 440 grains (almost an ounce) and is mostly hollow. It has a velocity of roughly 1,600ft/sec at the muzzle and 1,175ft/sec at 50yd. Muzzle energy is 2,364lb and 1,340lb at 50yd. For comparison a 9mm pistol round has less than 400lb of muzzle energy. A typical five-shot group of slugs at 40yd is 2in, and 9in at 100yd – a slug's maximum effective range – but the shotgun must have rifle-type sights to be accurate at over 40–50 yards. The common bead-type front sight is virtually worthless for any degree of accuracy. The rifled slug has characteristic rifling-like grooves on the sides. This does not impart spin as is often assumed. The slug's heavy nose and hollow body serve to keep it stable. The grooves reduce the slug's friction on the bore and allow it to be "swaged" down when fired through modified choke or full choke barrels. "Choked" barrels serve to tighten the shot pattern as opposed to cylinder barrels, which have no such bore reduction.

Shotguns are also effective for firing at known or suspected enemy at short ranges in underbrush. Their penetration into dense bamboo, tough brush, foxhole parapets, sandbags, masonry, board fences, etc., however, is limited. In World War I "trench brooms" were considered extremely effective for clearing trenches and pillboxes, and for use on night patrols into "no man's land" where close combat was expected. There are stories of

trench gun-armed soldiers in World War I deflecting enemy hand grenades skeet-shooting style (it may have happened, but not too frequently). At one point the Germans announced they would consider shotgun-armed Americans as war criminals, but the US countered that repercussions would be taken on German prisoners and the issue was dropped. Shotguns had seen earlier use in the Civil War and the Marines made good use of them in Central American jungles in the 1920s and 1930s.

During the Korean War they were sometimes used for close-in protection of crew-served weapons and short-range ambushes in limited visibility. Commonwealth forces made use of shotguns in the Malayan Emergency (1948–60), the Indonesia–Malaysia Confrontation on Borneo (1962–66), and in Kenya during the Mau Mau Uprising (1952–60). They had also made very limited use of privately purchased shotguns in World War I for trench clearing.

Shotguns are excellent weapons for guarding prisoners (they're intimidating) and guarding supplies, ammunition stocks, aircraft, and other materials as their short range poses less of a danger to friendlies and missed shots will inflict less damage than a high-velocity rifle bullet on what is being guarded or on adjacent buildings. Birdshot such as No. 6, 7½, 8, or 9 are well suited for home defense at "room ranges" and have an almost slug-like effect (a concentrated dense pattern of shot) at such short ranges. In fact, over-penetration can be a problem and care must be used when aiming. It has less chance of penetrating interior walls and harming innocents.

Twelve-gauge shotgun shells may have paper and brass, plastic and brass, or all plastic cases. There are also all brass cases and zinc cases with brass heads, but these are little used owing to their cost, but are excellent for reloading. Paper cases will swell in damp conditions (rain, tropics, sea air) and prevent loading or may jam when extraction is attempted. Paper cases will also deteriorate after repeated loading and unloading as required by guards. Basically, paper shotgun shells should be restricted to training and plastic and brass or all plastic shells used in combat and for guard duty. The shot size is usually printed on the side of the shell casing and the wad.

Military-issue shotguns typically have 20in cylinder barrels, i.e., they are not "chocked down" (slightly reduced bore) for a tighter shot group. A cylinder barrel provides the widest shot spread. The minimum legal barrel length for a civilian-owned shotgun in the US is 18in (46cm) and an overall length not less than 26in. One would be advised if making a "sawn-off

shotgun," "sawed-off shotgun," "room broom," or "short-barreled shotgun" (US legal description) to cut it down to no less than 18.25in so there are no legal questions. However, anything less than 20in causes too much spread, more muzzle blast, increased muzzle flash, and a harder recoil. There is also what was known as the "coach gun," a 10- or 12-gauge double-barrel shotgun with a 12– 20in barrel, which now have to be over 18in as well. They were carried by shotgun messengers (guards) riding "shotgun" on stagecoaches resulting in them also being called a "messenger shotgun." In Britain, Australia, etc. a shotgun with less than a 30cm (20in) barrel or where the overall length is less than 60cm (24in), is illegal and referred to as a "sawn-off shotgun." In Sicily a sawn-off 12- or 16-gauge double-barrel shotgun was known as a *lupara* (literally, "for the wolf" – *lupo* = wolf. They were popular with the *Mafia* (aka *Cosa Nostra*) and used for *vendettas* (reprisal killings), assassinations, self-defense, varmint hunting in close vegetation, and by shepherds to protect their flocks, its original use. The barrel was sawn off just forward of the forearm usually under 18in. The butt stock was also often cut off leaving a pistol grip and a cord or thin leather sling provided to carry it around the neck at waist level. It was easily concealed under a coat.

There is a difference between trench guns and riot guns. Both are generally 12-gauge pump shotguns with 20in barrels and under-barrel tubular magazines. Trench shotguns had the addition of a ventilated barrel guard to protect the firer's hands during prolonged shooting and a bayonet lug. Riot guns lacked these two features; the terms are often used interchangeably.

Owing to the rash of bank robberies in the 1920s, Ithaca marketed the Auto and Burglar shotgun. This was a 20-gauge with 12.25in (31cm) long double-barrels and a pistol grip rather than a stock. This was before ATF regulations restricted shotgun barrel length in 1934. The recoil and muzzle blast must have been astounding, even if just 20-gauge.

Then there's the old practice of removing birdshot from shotshells and replacing it with rock salt (aka ice cream salt or sidewalk salt). This was a common practice by property owners to discourage and warn poachers and "produce" thieves visiting their gardens and orchids. The effective range of the course rock salt is very short and is non-lethal over 6ft (but you are running a risk of causing serious wounds), but burns like sin if hit. At 12ft it might "burn" a person if it manages to penetrate clothing or his exposed

skin. A few grains might break skin at 10yd, but won't penetrate clothing. At 30yd it might scare off an animal, but have little effect on even a person's exposed skin. Finer salts such as table salt are too fine and thus ineffective for this purpose. What really scares off prowlers is not the burn of rock salt, but the blast of a shotgun. In this regard it would be just as effective to use blanks. Of course the simple clack of a pump shotgun being jacked has the same chilling effect without even firing it. The Spanish police have used rock salt-loaded shotshells for riot control. Dried pinto beans have also been loaded. Broken or ground glass has been used in shotgun shells. One would be ill-advised to load glass in shotgun shells as it could result in serious legal repercussions owing to the shooter's intent to inflict more painful and debilitating injuries. Hard rubber or plastic "buckshot" has been used for riot control.

The use of shotguns in combat does not violate the Hague Convention. Lead and antimony (to harden the lead) buckshot does not "expand" or flatten as easily as claimed by opponents. Even if it does it is no more illegal than conventional full metal jacketed, lead-cored bullets, or solid lead revolver bullets, which can deform or breakup themselves.

The realities of SMALL ARMS RANGES

The most common range given for a weapon is its **"maximum effective range."** This is the range at which the average soldier may effectively engage "point targets," usually stationary and at a known or closely estimated range, with a reasonable chance of hitting them. It is the range at which the weapon's fire may be adjusted using its normal integral sighting system and taking into account the weapon's and its ammunition's limitations. "Area targets," i.e., scattered groups of personnel or multiple targets scattered over a wide area, can be fired on at beyond maximum effective range, but with only limited effectiveness.

"Maximum range" is the extreme range to which the bullet will travel when fired at the optimum elevation. At such ranges, which may be thousands of meters beyond the maximum effective range, the projectile will not possess any degree of accuracy and will be erratic. This is mainly for range firing safety considerations and has no application in combat firing.

There is another range category that will not be seen in technical tables and weapons characteristics. **“Practical or effective combat range”** is affected by many factors other than the weapon’s characteristics, including: the soldier’s physical condition, fatigue, skill, attitude, and morale plus visibility and climate conditions. Of course the more adverse the weather conditions the lesser the practical effective range will be. Realistically practical combat range may be only half to three-quarters of the weapon’s stated “maximum effective range” or even much less.

What is a VERY PISTOL?

Many assume the Very pistol or Very gun is of British origin. However, the Very pistol and Very lights (flares) were developed in 1877 by a US Navy officer, Lieutenant Edward W. Very (1847– 1910). Sometimes misspelled as “Verey,” they were also incorrectly called a “Very’s” or “Verys” pistol. Awkward and unreliable fireworks-like signal skyrockets were used for night signaling between ships from the late 1700s. The first breech-loading Very guns used cartridges based on 10-gauge (0.775in) shotgun shells to launch variously colored flares (red, white, and green being common and amber and blue less used), which might be single freefalling flares, flare clusters (three or four flares), or parachute-suspended flares. Flares are also called “stars,” a term favored by seamen. Red or orange smoke cartridges are also available for daytime use, but other colors have been used by military forces for signaling. Smoke cartridges either leave a smoke trail (aka smoke streamer) or begin burning upon impact. They have been made in a number of calibers by many countries to include 12-gauge, 10-gauge (aka 20mm), 1in, 27mm (aka 26.5mm), 35mm, 37mm (aka 1.5in), and 40mm. Very pistols and similar flare pistols, signal guns, or pyrotechnic launchers, dischargers, or projectors are used by the armed forces and civilians to signal distress situations, mark locations, and to signal orders or actions. There have since been many different designs produced, but they all trace their roots to the 1877 Very pistol.

Movies and television frequently depict emergency signal flare guns being used as antipersonnel weapons. It is especially trendy to show a flare-shot individual, who is invariably grimly hit in the face, falling into the water and the flare eerily burning as he descends into Davy Jones’ Locker.

Flares do burn underwater – burning magnesium creates its own oxygen. They have also been depicted being fired at, and of course hitting, speeding cars, boats, helicopters, and airplanes. The very low velocity of flares and their arched trajectory make it almost impossible to effectively lead and hit a high-speed ground, water, or aerial vehicle. The flare "projectile" is very light and has no penetrating effect on even the lightest aluminum. There's no doubt that people have been lit-up by flare pistols, but there are probably more flare gun intentional shooting incidents in movies in the last 50 years than there have been in real life since 1877, excepting possibly the inevitable accidents.

What was "the GUN THAT WON THE WEST?"

The **Winchester Model 1892 carbine** is the most-seen lever-action weapon in Western movies (mainly because of the 5-in-1 blank). It is often thought of as "the gun that won the West," along with the similar Model 1894. The problem is that by the early 1890s the West was pretty much already won. These rifles are frequently seen in movies set in the 1860–70s or even before the Civil War when muzzle-loaders were just about all that was available.

The honor should actually be attributed to the **.44-40 Winchester Model 1873 rifle** (also produced in .38-40 Winchester from 1879 and .32-20 Winchester from 1884) and the **.44 Flat Henry Winchester Models 1860 and 1866** "Yellow Boy" rifles and carbines (see below).

The Models 1892 and 1894 were available in a number of calibers, the former chambered for short cartridges (.25-20, .32-20, .38-40, .44-40 Winchester) and the latter for longer, higher powered rounds (.25-35, .30-30, .32-40, .38-55 Winchester, .32 Winchester Special). Henry Winchesters had a relatively slow-loading tubular magazine, but the 1873, 1892, and 1894 had fastest to load side gate loading ports. In truth, it can be said that **the** *Winchester* **was** *the* **gun** that won the West and it should not be attributed to a specific model. However, if one had to be chosen, it is generally agreed that it is to the Model 1873 that honor goes, specifically in .44-40 it being said to have killed more men – good and bad – and more game – big and little – than any other cartridge. (The .30-30 Winchester[87] Model 1894 carbine was long said to have borne the distinction of killing

more deer than any other rifle. This can probably no longer be claimed owing to the profusion of modern bolt-action and semiautomatic deer rifles in the last 40 years.)

It can also be argued that the double-barrel shotgun was the gun that won the West. They were much more widely used than portrayed in Western movies and novels.

The Colt .45 Model 1873 single-action Peacemaker revolver, aka the "Equalizer" or "thumb-buster," is often called the "revolver that won the West". Of course there were many other models of Colts and the other most common makes were the Smith & Wesson, Remington, and the little known or credited Merwin Hulbert. In reality, the Peacemaker was probably not quite as widely used as Hollywood portrays.

Regardless of what gun or guns won the West, what were just as important to the winning of the West, besides an intractable pioneering spirit, were the railroad, telegraph, and barbed wire.

Who was HENRY WINCHESTER?

There was no such person. "Henry Winchester" referred to the .44 Flat Henry Models 1860 and 1866 rifles and carbines. These first truly successful lever-actions were nicknamed the "Old Henry" or more commonly the "Yellow Boy" or "Old Yellar" because of their distinctive brass receivers, actually a bronze alloy known as "gunmetal." Technically the Model 1860 was not called the "Henry Winchester," but just the "Henry." It was designed by Benjamin T. Henry (1821–98) and manufactured by the New Haven Arms Company in New Haven, Connecticut. The Model 1866 was properly called the "Henry Winchester" and its revolutionary side-loading gate was invented by Nelson King. This replaced the Model 1860's awkward loading into the front end of the under-barrel tubular magazine, a tedious job. The side-loading gate was used in all subsequent Winchester lever-actions. Oliver F. Winchester (1810–1880) was the primary stockholder and owner of the Henry rifle patent, from which later Winchester lever-actions evolved. The firm evolved into the Winchester Repeating Arms Company in 1866.[88]

FACT:
By the way, Oliver Winchester never designed a single firearm or weapon feature; he was purely a businessman and politician.

World War II motion PICTURE WEAPONS MISTAKES

Mistakes with weapons are common in World War II movies, this section can detail only a few.

Tanks and other armored fighting vehicles (AFV) were especially abused in past years with M24, M41, M47, and M48 tanks portraying US and German tanks. None of these had been used in World War II other than the M24 light tank in the closing months. US halftracks often portrayed German halftracks and were of an entirely different appearance; US halftracks had vertical sides whereas the Germans had angled sides and completely different bogie wheel designs.

Through the 1950s some World War II equipment was still in use, especially in National Guard and Reserve units and might have appeared in movies, although the versions still in use were usually upgrades of World War II models. Most movies about the Marines filmed in the 1950s had the benefit of actually being supported by the Marines Corps, which still used some upgraded World War II Sherman M4 tanks, LVT(3) amphibian tractors (amtracs), and LVT(5)(A) amphibian tanks. There were few authentic and operational period AFVs available and anything handy was used. Some efforts were made to modify vehicles to look like German AFVs and re-enactor and restored vehicles were occasionally used. In recent years studios have made more of an effort to use restored vehicles, which has greatly expanded as a hobby, or build accurate mockups. Of course computer generated imaging (CGI) has greatly enhanced the capability to replicate authentic appearing AFVs, aircraft, ships, entire fleets or air armadas, or anything else.

Movie studios should perhaps be excused to some degree for using incorrect and post-war vehicles and aircraft. There are just not that many available and transportation costs plus shipping time limitations prevent the

proper vehicles in any numbers being assembled for a movie production, especially if filmed on location outside of the US.

In the area of small arms all sorts of weapons have been used interchangeably, such as American troops carrying British Lee Enfields, and Japanese have so often appeared armed with German MP.40 machine pistols that some believe they actually used them. The list is a long one.

Studios were particularly hard pressed to find suitable Japanese weapons. Again, more effort is now being made to achieve accuracy. One thing to remember is that while a weapon or piece of equipment may have been adopted before the end of the war, it required up to a year for production lines to be tooled, for it be produced in sufficient quantity, passed through the supply system, and finally distributed to units. A further delay was experienced for units engaged in combat who would not receive the new items until rotated out of the line for rest and recovery. It often took even longer to field a new weapon.

REMEMBER:
Never ever make the mistake of believing a weapon was used in a particular unit, in a particular period, or a particular area just because its seen in a movie.

Many World War II movies filmed in the 1960s and 1970s were filmed in Spain using Spanish Army equipment, including US tanks with which it was equipped. In the same timeframe and into the 1980s many other World War II movies were filmed in Yugoslavia using mainly Soviet-designed equipment.

Some movie mistakes have been taken as the gospel truth. In *Sergeant York* (1941), an otherwise excellent movie, Gary Cooper portrayed Alvin York's legendary feats using a Springfield M1903 rifle and a captured German Luger P.08 pistol. In reality Corporal York was armed with an Enfield M1917 rifle (with which the 82nd Division was armed in its entirety) and a Colt M1911 pistol (infantry corporals and sergeants were then issued pistols). A Luger was used in the movie because the available M1911 would not operate reliably with blanks. York's division had been issued M1903s for training, but turned them in when deployed "over there,"

and the M1917s were issued in France. York was said to have preferred the M1903, and some claim that he somehow managed to obtain an M1903 while on active service, but documentation and period interviews verify the use of the M1917. It just does not seem likely that a mere corporal, before he demonstrated his famous martial prowess, would be allowed to obtain a rifle other than what his unit was armed with. There is still a great deal of debate on the subject, however.

Following are some minor details to look for in the movies, depicting the small arms of World War II:

- The .30-caliber M1 carbine is sometimes seen with a bayonet lug. However, the M4 carbine bayonet (developed from the M3 fighting knife) was not adopted until late 1944 and unit armorers retrofitted the T4 bayonet lug on a slip-on barrel sleeve. They only began to be issued in mid-February 1945 and very few were retrofitted before the war's end. They apparently saw some use in the final months of the war in the Pacific but they were not seen in Europe at all. The same applies to the adjustable rear sight added at the war's end. The small L-type rear sight was used and the adjustable sight saw little if any action.
- The .30-caliber M2 carbine was also adopted in late 1944. It was provided with a selector lever to provide it semi- and full-automatic fire. At the same time the 30-round curved "banana" magazine was adopted with the M2. Because of tool up and magazine production delays no M2 carbines or 30-round magazines were issued during World War II, even in the Pacific – despite what you see in the movies. M2 carbines did not see combat until the Korean War and M1 carbines remained in use during that conflict.
- The .30-caliber M1918A2 Browning automatic rifle (BAR) was provided with a carrying handle. However, this too was not adopted until late 1944 and was retrofitted by units. It was not until 1945 that they were fielded and very few were actually fitted during the war. Many BARs used during the Korean War still lacked them.
- The .45-caliber M3 submachine gun, or "grease gun," was adopted in December 1942, but production did not begin until mid-1943 and issue did not begin until the year's end to see its first combat use in

Normandy. The M3A1 was adopted in December 1944 and few if any were issued overseas by the war's end. All in all, a lot more submachine guns are shown in the hands of Hollywood troops than there were in actual general use.

Motion picture WEAPONS FALLACIES

Mistakes, exaggerations, and over- and underachievement in the **use, operation, and capabilities of firearms** are widespread in motion pictures and television. The wrong weapon for the wrong era is common and of course there are the weapons that seldom, if ever, need reloading. The following are the most common movie fallacies in regards to weapons and ordnance, however there are many other examples.

- A character armed with a pump shotgun, after running about or pointing it at and ordering another character to do whatever, finally pumps the action to load it, even if he'd already fired it (and never shows the round that would have been in the chamber being ejected). It makes for a dramatic point of emphasis. The same is occasionally done with working a pistol's slide and a stick shift even if the car's been going top speed.
- A sniper makes fine adjusts with the elevation and windage knobs on his telescopic sight before taking the "impossible" shot. By doing so he has just thrown his sight off. Those knobs, called "turrets," which are normally protected by screw-on covers to prevent them from being inadvertently tampered with, are used to adjust the sight's windage and elevation reticles when the weapon is being fired to zero it, that is, to align the sight with the weapon's bore. Once a weapon is zeroed the knobs are seldom touched. The elevation knob may be adjusted for minor atmospheric differences from when the weapon was last zeroed, angle of inclination or declination to the target, etc. There is, however, a focusing control at the ocular end of the sight that the sniper may adjust, but other unnecessary adjustments are made by the actor instead.
- Bullets do not bounce off automobile bodies (showering little sparks) unless they strike at a very low angle. They may not penetrate through interior paneling or structural framing, but they almost always penetrate

the 22-gauge (0.71mm – 0.0279in) “thick” sheet metal body. Bullets also do not bounce off helicopter or airplane fuselages. A man can punch a screwdriver through aluminum aircraft skin.

- Bullets do not make entry holes through metal doors, automobile bodies, or steel building sides larger in diameter than the bullets are. They are probably made over large so that they show up on the film.
- When a bullet penetrates an automobile windshield or side or rear window it does not disappear. It has to exit somewhere or strike someone or something in the vehicle. Bullets are often shown penetrating the windshield, but they never seem to make it to the back window, for example. Bullets hitting the rear window as a car flees the bad guys never make it to the windshield, they “disappear” somewhere inside the vehicle. The same when a bullet strikes an object, be it a can tossed in the air, a whisky bottle in the town drunk’s hand, or any other object. The bullet has to go somewhere, but that little fact is usually ignored.
- Bullets are not stopped by ¾–1½in (19–38mm) thick table tops, other pieces of wooden furniture, common doors, or sheetrock or plaster walls.
- Bullets are not stopped by refrigerator doors or automobile doors. That includes police car doors, which are seldom armored as opposed to the popular perception created by movies. Bullets do not leave burn marks on wood or cloth, or paper targets. The bullet may be hot from the exploding propellant and bore friction, but not that hot, and they go through the material so fast that it is not in contact long enough to scorch it, even if it could. Nor do bullet wounds or bullet holes in wood produce smoke.
- Rifles, shotguns, and handguns really do recoil. So do artillery pieces (muzzle- and breech-loading), tank guns, antitank guns, and antiaircraft guns. Blank charges fired in artillery and so on, since they are not throwing a projectile, do not have enough impulse power to cause the weapon to recoil.
- It is just about impossible for a rifle bullet to penetrate lengthwise through a telescopic sight as is so often seen. Telescope tubes typically have six solidly mounted internal lenses, most of which are very thick … it has been tested.

- While red laser sight dots may be seen dancing about on a person's body, the beams themselves are invisible to the naked eye. The crisscrossing red or green (which have shown up in recent movies) laser beam lines cannot be seen either. If they could be seen no one would use them as they point directly to the shooter which of course warns the target. The only exception is if there is fog or fine dust in the air. This will give the laser beam a flickering appearance and can be seen to some degree when viewed obliquely, but still would be almost impossible to be seen by the target.
- Silencers on revolvers do not work (see "Are silenced revolvers effective?" below) and when depicted on a handgun or rifle they are often far too small to be workable. It's not uncommon to see silencers about 1in in diameter and 3in long on 9mm pistols – far too small to be effective.
- One does not hear an explosion at the same time as one sees a distant explosion nor hear small arms shots the same time they are fired, even from a relatively short distance. Most movies depict the sound of the shots simultaneously with bullet impacts, as though it's the bullet hits that make the gunshot sounds. This is probably derived from the sound of "blood" squibs popping and the assumption that bullets really do go "bang" when they hit. (The speed of sound in dry air at 68°F (20°C) is 343m/sec, 1,235km/hr, 770mph, or 1,129ft/sec at sea level.)
- Bolt-action and lever-action rifles do not fire as fast as semiautomatic weapons. The shooter has to work the action between shots and re-aim. The rapid "bang-bang" so often heard in movies cannot be achieved with these weapons. When you hear the rapid shots you don't see anyone working the action that fast. The shooter is often conveniently off-camera.
- Weapons do need to be occasionally reloaded.
- In combat soldiers carry magazines and cartridge clips in their ammunition pouches. Movies tend to ignore this and the pouches are usually empty.
- Muzzle flashes, especially of some weapon that is supposed to be special or otherwise awesome, are often exaggerated for increased visual effect. This may be accomplished by specially loaded blanks or even special flash-enhancing flash "suppressors."

- Grenade, mortar, artillery, and bomb explosions are not bellowing, gasoline-induced fireballs, as visually stimulating and pretty as they may be. Most actual explosions are dirt, dust, and gray or white smoke and very little if any observable flash, especially in daylight.
- 20mm antiaircraft guns do not have airbursting projectiles exploding like large-caliber flak shells. The smaller rounds only detonate on contact with the target. (There are some rounds with self-destruct elements that cause the round to airburst rather than fall to the ground, but their bursting range cannot be set and they are set to burst near their maximum range.)
- 40mm Bofors antiaircraft guns are often given the heavy boom sound effect of heavy artillery when fired rather than a sharp crack.
- Tracers do not look like penny bottle rockets leaving trails of sparks nor do they whistle when passing overhead. Only tracers seem to whistle past in movies. Tracers crack just like other bullets, which itself is seldom depicted in movies.
- When cameras "follow" bullets they are seldom boat-trailed rifle bullets, but pistol bullets regardless of the weapon from which they were fired.
- The firer can tell if he is firing blanks or not. All too often characters are "fooled" into thinking they are firing live ammo when they are firing blanks. Blanks have *no* recoil, no matter how big a charge they contain. Additionally, any semiautomatic or automatic weapon must have a blank-firing adapter (BFA) (aka blank-firing device) in order for the weapon to function with blanks. Without the muzzle fitted device[89] the weapon will fire only one shot no matter how hard and long the trigger is held down, nor will the case be ejected. Characters cannot simply switch magazines firing live ammunition to magazines with blanks. Characters on the receiving end, unless never previously shot at, will know blanks are being fired owing to the lack of bullet impacts and supersonic cracks.
- Cartridges thrown into a fire or otherwise burning do not shoot off their bullets when they explode to hit the panicked bad guys. Burning cartridge cases only rupture or split scattering a few small, non-lethal brass fragments. The bullet either remains in the ruptured case or is simply popped out without traveling any distance.[90]

- Small shoulder-fired rocket launchers and recoilless weapons, 40mm grenade launchers, and hand grenades do not blow buildings and vehicles apart with massive explosions and billowing fireballs nor flip automobiles into the air and upside down. Their impact is actually pretty unimpressive with a small flash and a relatively small cloud of dust and smoke.
- The back blast of bazookas, LAWs, RPGs, recoilless rifles, man-portable aid defense missiles, and similar shoulder-fired rocket launchers and recoilless weapons require at least a 15-yard, usually much more, clear area of almost equal width to safely fire it. The back blast will disintegrate a stack of heavy wooden ammunition boxes. They cannot be fired from within enclosed rooms or vehicles without a large opening (windows and doors) behind it to relieve the considerable blast overpressure. They cannot be fired at all from within helicopters. The back blast seems to be absent in some scenes and massive in others depending on the director's desired visual effect.
- It is not unusual to hear firearm make and model names that were made up by scriptwriters because they sound cool or menacing.
- A person cannot outrun explosions and fireballs, even if they are both moving in slow motion. Nor will people fixedly stare straight ahead acting as if the explosion they caused did not occur as they walk away from it, no matter how resolute and hard-boiled they wish to appear. Everyone looks back at an explosion. Also, they cannot dive through glass windows without being shredded, even if doing it in slow motion.

REMEMBER:
A few simple rules of thumb are offered in regards to Hollywood and television war movies, or any other genre for that matter:

1. If it does not look right it's probably not.
2. Regardless of how much they tout their meticulous research and attention to detail in "Making of…" videos, they really don't. What little research is actually accomplished is often limited to specific areas.

3. Don’t expect Hollywood to get it right and you won’t be too disappointed.
4. Never ever base real history on what you see in movies, even if the credits say “Based on the book,” “Based on an inspiring true story,” “Inspired by actual events,” or “This could really have happened so long as actual history is totally ignored and the laws of physics disregarded.”

Is it true that SILENCED REVOLVERS are effective?

One sometimes sees revolvers fitted with silencers in movies. **It won’t work.** There is a slight gap between the cylinder and rear end of the barrel shank and this allows a significant report when the revolver is fired, even if there is a silencer. When fired in the dark a small “cylinder flash” can be seen emerging from this gap and one can receive burns or even lacerations if a hand is too close. Unless specifically looked for it is not too notable owing to the much larger muzzle flash. What are seen in movies are usually normal Colt and S&W revolvers fitted with a fake silencer and a dubbed in “pop.” Silencers simply do not work on revolvers.

FACT:
Silencers, by the way, do not work with blanks. A bullet has to be present to contain the propellant gas allowing it to be diverted into the silencer’s baffles.

The only revolver that can be effectively used with a silencer is the Russian 7.62mm M1895 Nagant. The 7.62x38mmR cartridge had a bullet completely recessed into the cartridge case (making it appear as though it were an empty case or a blank). The end of the case protruded very slightly beyond the front end of the chamber. When the weapon was cocked the cylinder rotated to the next chamber and cammed forward. There was a recess around the forward end of each chamber allowing it to telescope a fraction of an inch onto the barrel shank, which protruded slightly from the

frame and the protruding case neck slid into the end of the barrel to create a seal, a “gas check.” This had the added advantage of perfectly aligning the cartridge with the barrel. The cylinder chambers do not always absolutely align with the barrel on many revolvers being fractions of an inch out of alignment to “shave lead” from the bullet. This affects accuracy to a degree, but does not create a safety hazard unless excessive. The hammer fell firing the weapon and the cylinder withdrew to its rearward position. The main purpose of this was to improve accuracy and provide a higher velocity by preventing gas leakage. However, it only raised the velocity from between 50 to 150ft/sec (15–45m/sec). It was somewhat of an imagined problem as the result was an overly engineered, overly complex, and expensive weapon that did not significantly improve its shooting qualities; it was still underpowered. During World War II the Soviets fitted some Nagants with a large silencer known as the Bramit device and these were used by reconnaissance troops and the NKVD (predecessor of the KGB). This required a special barrel and a major modification of the cartridge ejector system, which was in the way of the silencer. The Nagant, being only .30-caliber, allowed for a seven-round cylinder. Other revolvers such as the Belgium Pieper were made in this and other calibers, but did not have the camming gas check cylinder.

For automatic pistols to be fitted with a silencer or sound suppressor usually requires a special longer barrel to replace the standard barrel or major modifications are made to the existing barrel, i.e., external muzzle treading, modified barrel bushing, etc. It is seldom that the standard barrel can be modified. Nor are pistols completely silenced. There is often a minute amount of gas leakage from the chamber when fired, which contributes to the firing signature. The slide recoiling to the rear and then slamming closed, as it strips the next round out of the magazine and chambers it, all make a noticeable sound. It is much more than a little *phutze* sound, but a mechanical ratchet noise. There are very few pistols made with a capability to lock the slide in place to prevent it from recoiling. Of course such a handgun has to be unlocked, a fresh round noisily chambered, and then relocked before firing again. It is significantly quieter than an unsuppressed shot though. A silencer does increase the weapon’s bulk, throws off its balance, makes it awkward to handle, more difficult to conceal, and slightly reduces bullet velocity. Bulky silencers may also block the line of sight. On rifles they affect the accuracy at longer ranges.

FACT:
The first commercially successful weapon suppressor was patented by Hiram P. Maxim, the son of Sir Hiram S. Maxim of machine gun fame, in 1902; the Maxim Silencer sold with its famous "Dr. Shush" logo – "The gentleman's way of target shooting." The same enlarged design was adapted as a muffler for internal combustion engines on vehicles and boats. Silencers were outlawed in the US in 1926 and reaffirmed illegal in 1934.

Does SUPERSONIC AMMUNITION effect silencers?

Much is made of using subsonic rounds with silencers so that the supersonic bullet crack, snap, or thump does not alert those downrange.[91] That is a consideration when using sniper rifles, although a subsonic rifle round would suffer from reduced range, accuracy, and penetration, and as such, snipers tend not to use them. At pistol and submachine gun ranges (50m or less) it is of little necessity under usual circumstances. The greatest value of silenced pistols and submachine guns is during antiterrorist and SWAT-type (Special Weapons and Tactics) actions to simply save the eardrums of the rescuers and hostages. If the target is hit the supersonic crack is a moot point. The crack will not alert others unless they are very close to its path passing over or immediately next to them. It is almost impossible to determine the direction and range of a single report of a sniper's rifle shot or indeed to determine direction and range in built-up areas among buildings, in forests and jungles, or among hills and ridges owing to sound reflection and echoes. Sound too travels slower in cold temperatures, travels further over water and level, open ground, and is muffled by rain, snow, and fog.

In World War II, the Soviets issued subsonic 7.62x54mmR ammunition known as "partisan cartridges" (*partizanniy patronniy*), for use in sniper rifles. It was not used in conjunction with silencers, but in sniper rifles and standard rifles used by harassing sharpshooters.[92] They did issue a silencer for the 7.62mm Mosin-Nagant M1891/30 sniper rifle, the *Glushitel* S-40, but it saw little use and appears to have been commonly used with standard

ball ammunition. The Germans made subsonic 9mm machine pistol rounds during the war as did the British for use in their Mk IIS silenced Sten gun.

Major D. I. A. Mack (then a lieutenant platoon commander) serving with 1st Battalion the Royal Scots Fusiliers during the Malaya Emergency in 1955 sheds some light on a little known, specialized silenced weapon that appears to have been effective;

> I and my platoon tried out a new weapon today (new to us), the Delisle [sic] silent carbine.[93] This is a very cut-down rifle adapted to fire .45-inch and fitted with a silencer. It looks like a rifle butt and breech joined on to a long cylinder and it is meant for the silent knocking of bandit sentries or for any other occasion when one wants to run out a chap without warning his muckers of the wrath to come. It was the first time I have ever seen a silent weapon fired and it was rather uncanny as there was no bang whatsoever – just the click of the released firing pin, the whiz of the bullet (not heard normally) and the thump as the bullet hits the stop-bank (or body). In the jungle most of the noises would be smothered and would pass unnoticed if not unheard.

Is it true that the Soviet RPG-2 was developed from the German *Panzerfaust*?

The Soviet-designed RPG-2 antitank projector, the Chinese-made copy, the Type 56, and North Vietnamese-made version, the B40, have been used worldwide by conventional armies, insurgents, and terrorists as an extremely effective lightweight, shoulder-fired weapon. They have been used to attack AFVs, soft-skin vehicles, helicopters, field fortifications, buildings, personnel, and other targets. They are easily portable, easy to conceal, easily maintained, easy to use for training gunners, simple to operate, reliable, and effective against even heavily armored AFVs.

The origin of the RPG-2, introduced in 1954, is often attributed in some way to the German *Panzerfaust*[94] antitank projector (while the weapons possess similarities, there are a great many significant differences too). This is true in a remote way, but the usual claimed stories of how the Soviets originated the RPG are mostly incorrect. These rumors include:

1. The Soviets designated captured German *Panzerfäuste* the RPG-1.
2. The Soviets took over captured German factories and continued producing *Panzerfäuste* as the RPG-1.
3. The Soviets captured the plans and/or reverse engineered the *Panzerfaust* and produced it in their own factories as the RPG-1.
4. The Soviets moved the German manufacturing equipment to the USSR and produced their own version of the *Panzerfaust* as the RPG-1.

None of these scenarios is true. The Red Army did capture and use *Panzerfäuste,* which they nicknamed *Faustniki* (*Faustnik* – singular), as they had no comparable man-portable antitank weapons. Indeed, so many *Faustniki* were captured that the average Red Army rifleman became as familiar with it as his own weapons. However, the Soviets did not produce their own *Panzerfäuste* from reverse-engineered captured examples as often claimed, nor did they designate captured *Faustniki* the "RPG-1," or manufacture *Panzerfäuste* for their own use in captured or transferred factories.

All *Panzerfaust* development and most production was carried out by *Hugo Schneider A.G.* (HASAG) in Leipzig-Schönefeld 90 miles (145km) southwest of Berlin and at an HASAG-operated plant at the Schlieben Concentration Camp 50 miles (80km) south of Berlin. Leipzig was occupied by US troops on April 20, 1945, 18 days before V-E Day (May 8), and the city was not turned over to the Soviets until July. However, the Schlieben plant (*Hugo Schneider, Schlieben Werk*) was occupied by the Soviets on April 21. *Panzerfaust* production was carried out by slave labor at both Leipzig-Schönefeld and Schlieben. At Schlieben the Soviet's found only 130 sick and weakened workers, some 5,000 had been evacuated days before. *Robert Tümmler Metallwarenfabrik* in Döbeln, 90 miles (145km) south of Berlin, also produced *Panzerfäuste* and was the exclusive producer of the few *Panzerfaust 150.* Unscathed Döbeln was occupied by Soviet troops on May 6, two days before V-E Day. Its staff too had been evacuated.

Contrary to popular belief, the Soviets could not possibly have placed any of these factories in operation, especially since the delivery of raw materials and the many subcontracted components had ceased. The launcher tubes were fabricated by *Volkswagen-Werke* in Fallersleben, for example, which had been occupied by US troops on April 18 and

production had halted earlier. Moreover, there were no personnel to operate the plants. The *Panzerfaust* plants' machinery was not removed until sometime after the war, so again, it cannot have been taken by the Soviets for production in the Soviet Union immediately following the war.

The Soviets had set about developing an improved weapon influenced by, but certainly not copied from, the *Panzerfaust* in 1944. The confiscated machinery may have been partly used or copied to produce the Soviets' own RPG-2 after the war, especially the projectiles, but not the RPG-1, of which only a few prototypes were built. (There were developmental problems with both the weapon and ammunition, so the RPG-1 was dropped for the RPG-2.)

It is also said that the Soviet RPG-1s were copies of the *Panzerfaust 100.* The *Panzerfaust 100* was widely used and similar in design to the extensively used *Panzerfaust 60.* At the same time others say the RPG-2 was literally copied from the *Panzerfaust.* However, the two weapons were of much different design regardless of superficial similarities. The *Panzerfaust* were single-shot throwaway weapons with crude sights, simplified percussion powder train firing mechanisms, and no pistol grips. The RPG-1 and 2 were reloadable, had improved sights, and a rifle-like trigger and firing pin system with a pistol grip.

Another rumor is that the RPG-2 was copied from the *Panzerfaust 150.* This too is a myth. The *Panzerfaust 150*'s long, pointed warhead though provided the basis for the RPG-2's PG-2 HEAT round, but the rounds were very different. The earlier *Panzerfäuste 30, 60,* and *100* had proportionally larger, blunt-nosed warheads. Development of the Soviet RPG-1 began before the *100* was fielded in November 1944 and long before the factories were captured. A major difference between the RPG and the *Panzerschreck* and bazooka was that these latter weapons used an electrical system (magneto or batteries) to initiate the propellant. RPGs used percussion firing systems, i.e., a trigger-released hammer striking a firing pin that strikes an ignition primer.

If anything, the RPG-2's grandfather was actually the *Panzerfaust 250.* This developmental weapon was to be reloadable and had other features similar to the future RPG-2 including a pistol grip. It had a long pointed-nosed projectile similar to the *Panzerfaust 150*'s and was intended to replace earlier *Panzerfäuste* and the bazooka-like 8.8cm *Panzerschreck.* It was scheduled for introduction in September 1945 and was not even built in

prototype form. Both the US and the USSR captured plans for the *Panzerfaust 250* and it is said to have influenced the design of the RPG-1, however the prototypes for the RPG-1 were not copies of the *Panzerfaust 250* or any other *Panzerfaust,* but a much different weapon. Development of the much improved RPG-2 began in about 1950 and was fielded in 1954. Development of its potential replacement, the RPG-5 and RPG-7, began in 1958. The RPG-7 proved to be the much superior of the two options and was fielded in 1961.

Does the RPG-18 fire if the extended tube is closed?

The Soviet single-shot, disposable 64mm RPG-18 *Mukha* (Fly)[95] antitank weapon appeared in the mid-1970s, but its existence was not common knowledge until about 1980. The weapon was essentially a copy of the US M72 light antiarmor weapon (LAW). Unlike the LAW though, once the telescoping inner tube containing the rocket had been extended to the firing position it could not be re-closed. The same applies to the RPG-18's 1985 replacement, the 73mm RPG-22 *Netto* (Net). Some commentators interpreted this to mean that these weapons would fire unintentionally or even explode in the tube if an attempt was made to close it. This is not true; it could just simply not close as the tube was in an irreversible locked position: essentially, if the tube was extended to engage a target and then not fired, it could not be re-closed for later use. It had to be carried about extended if it might be used soon, or the manual directed that it should simply be fired in the direction of the enemy to rid themselves of it. It was not armed in the extended position, but had to be cocked just as the LAW. This deficiency was corrected in later disposable weapons such as the RPG-26 and RPG-27.

There are many rumors and myths, but what does "RPG" actually mean?

The Soviet/Russian RPG-7 is probably one of the most widely used and best known shoulder-fired antiarmor, antipersonnel, anti-helicopter, anti-building weapons in use today. There are several models of RPGs such as

the reloadable RPG-2, 7, 16, 29, and 32,[96] along with the single-shot, throwaway RPG-18, 22, 26, 27, and 30. There are also similar single-shot weapons made by Eastern European countries designated RPG, the Czechoslovak RPG-75 (*Reaktivni Protitankova* or *Pancéřovka*) and Polish RPG-76 (*Rêczny Ppanc Granatnik*), both single-shot weapons.

"RPG" is normally translated into English as **"Rocket-Propelled Grenade,"** but it means ***Ruchnoi Protivotankovii Granatomet* (hand antitank grenade launcher)**. Most models can best be technically described as recoilless antitank projectors, not "rocket-propelled grenades." It also means *Ruchnoi Protivotankovii Granati* (antitank rocket grenade). This latter term refers to the single-shot, disposable models. Slight differences in the spelling of these terms will be found when transliterated from Cyrillic. The term "antitank grenade" (*Protivotankovii Granata*) is used to identify the basic HEAT projectile used in these weapons.

The RPG-2 was a "recoilless weapon" and not a rocket launcher. A propellant cartridge launched the projectile. The non-reloadable German *Panzerfaust* used a similar propellant cartridge.

The RPG-7 and 16 are "rocket-assisted recoilless weapons." A propellant cartridge launches the projectile and a rocket booster charge ignites immediately after launching to increase the projectile's velocity and range. The single-shot, disposable RPG-18, 22, 26, 27, and 30 are true "rocket launchers."

There was another meaning for "RPG," besides "Role-Playing Games" referring to player-involved fantasy games. During World War II the Soviets issued three antitank hand grenades: RPG-40, 43, and 6,[97] which remained in post-war use. In this instance "RPG" means *Ruchnoi Protivotankovii Granata* (hand antitank grenade).

The North Vietnamese and Viet Cong referred to the RPG-2 and RPG-7 as the B40 and B41, respectively. The "B" means "*Ba do ka*," Vietnamese for "bazooka."

FACT:
Another RPG-7 myth surrounds the "range booster" that was attached to the PG-7 HEAT projectile which was sometimes reported as being found in Vietnam. The "range extenders" were duly turned into technical intelligence for evaluation and turned out to be nothing more

than the standard tubular booster charge that screwed onto the rear end of the rocket tailboom. The tube not only contained the booster propellant, but the folding fins and a red-burning tracer. It was integral to the functioning of the weapon and could not be fired without it. Troops unfamiliar with the characteristics of the RPG-7 did not know what the booster charges were or their relationship to the projectile and assumed them to be "range boosters."

Was it really *KATYUSHA* rockets that were raining on Israel?

During the 2006 Hezbollah offensive against Israel the terrorists launched hundreds of various types of unguided rockets from southern Lebanon. The news media referred to these tube-launched, spin-stabilized rockets collectively as "Katyushas." Israeli Defense Forces and civilians commonly used this term as well. In some ways these rockets were similar to the original Soviet "Katyusha" rail-launched, fin-stabilized rockets of World War II and the term was already in use to generically describe them. However, technically the Hezbollah rockets are not "Katyushas."

During World War II, *Katyusha* referred to Soviet truck-mounted multiple rocket launchers in general, but specifically the BM-13[98] (132mm with 16 launch rails). The Russian nickname is from a song by the same name about a girl longing for her far-away soldier lover. The sound of the barrage rockets being fired is said to refer to the song's crescendo. *Katyusha* is the diminutive of the name, *Ekatherina* (Katherine), *Katya – Katyusha.* Other similar rocket launchers were the BM-31 firing 12 300mm rockets, aka *Andryushas* (endearing form of Andrei), and the BM-8 firing 36 or 48 82mm rockets, both of which were also generally called the *Katyusha.* The Germans also called them the *Katyusha* as well as the *Stalinorgel* (Stalin's organ). These were all fin-stabilized rockets launched from rails.

The BM-13 was replaced in the 1950s by the truck-mounted BM-14, which fired 16 or 17 (two versions) 140mm spin-stabilized, tube-launched rockets. (The towed RPU-14 launcher had 16 tubes.) This in turn was replaced in the 1960s by the BM-21 Grad, which fires 122mm fin-stabilized, tube-launched rockets. While there may be BM-13 systems still in service in poorer nations, the rockets one reads about in the news today

are not *Katyushas*, but are most often 122mm Grad rockets, as well as Chinese 107mm Type 63 rockets, which are similar in design to the Russian 140mm BM-14 rockets.

Another form of rocket is built in the Gaza Strip by the Palestinian Hamas, the *Qassam* (sometimes incorrectly spelled as "Kassam"). These homemade rockets appeared in 2001 when they began to be fired into Israel as a psychological/terror weapon. The rockets were named after Izz ad-Din al-Qassam (1882–1935), the martyred leader of the Palestinian Black Hand militant group (*al-Kaff al-Aswad*) who was killed by British Police in the British Mandate of Palestine. His name is carried by the armed branch of Hamas, the Izz ad-Din al-Qassam Brigades. While crude and marginally effective, they are somewhat advanced by the simple fact that they usually work and achieve their goal as a terror weapon. As with the *Katyusha*, the media and others use Qassam as a generic name for any Palestinian-fired rocket.

What kind of LANDMINE does not detonate when stepped on, but explodes when the foot is lifted off?

Vietnam (and other conflict) movies sometimes depict an unfortunate grunt stepping on a mine, hearing an ominous click, looking down at his boot to find he is standing on a mine, and freezing in place. The rest of the platoon gathers around in a cluster (for good camera framing) warning him not to move his foot or the mine will explode. They usually come up with some inane means of getting the guy off the mine. In recent post-Cold War conflict movies similar mines have been depicted, usually with the unfortunate doomed individual left standing all by his lonesome until he runs for it or can no longer stand. In the movies it's invariably depicted by simply showing a long shot of a forlorn wooded area with a sudden piercing scream followed by an echoing explosion.

There is not and never has been any such mine fuse in anybody's inventory in so far as this writer has been able to determine. A considerable number of references were researched and specialists consulted including US Army Explosive Ordnance Disposal personnel and the Army Engineer Center.[99]

This myth originated from the German “bouncing Betty” or “S-mine” and a misunderstanding as to how it functioned. Whether the mine was activated by a pressure fuse or tripwire made no difference, it was activated and would fire in a few seconds whether the individual removed his foot or not. The buried “S-mine” was activated by horizontally strung tripwires set a few inches off the ground. When tripped the mine fired a cylinder several feet into the air with a muffled pop, which then detonated showering nearby troops with 360 steel ball bearings. It could also be fitted with a pressure fuse that detonated the mine when stepped on. Either way there was an average 3.9-second delay between tripping the wire or stepping on the mine before the cylinder was fired in which time soldiers knew their goose was cooked and could not outrun it, even if they realized they had triggered it. It made no difference if they removed their foot from it or not, it was going to go off. The shrapnel could reach over 150 meters. (See “Where did the nickname “bouncing Betty” for antipersonnel mines come from?”)

The following description of the S-mine is from the July 1944 issue of the US Army’s *Intelligence Bulletin* based on experiences in Italy:

> Between the firing of the igniter and the ejection of the S-mine from the ground, there is a delay of from 3 to 6 seconds [average was 3.9 seconds]. Between the ejection and the detonation, there is a delay of from 0.4 to 1.4 seconds [average was 0.6 seconds]. In each case the variation seems to depend on the condition of the explosive and of the ground in which the mines are laid.
>
> It has been observed that eight out of ten mines rise from 4 to 10 feet and that about two out of ten mines explode in the ground. (There are occasional duds.)
>
> A dead weight of 140 lb (63.4 kgs) (approximately that of a man) will not prevent an S-mine from rising in the air before exploding. Therefore, a man who remains standing on a mine becomes a serious casualty and does not necessarily prevent others nearby from suffering injuries.

It has been suggested that mines of this type may have been fitted with a pressure-release type firing device such as the US M5 “mousetrap.” It is used in booby-trapping and can be fitted to an antipersonnel mine. This is

not the case. Pressure-release devices function by having a weighty object set atop the firing device. It is armed by pulling the arming pin. When the object is lifted off the explosive charge detonates. It is not activated by someone stepping on it and then removing their foot. It must already have at least a 5lb (2.25kg) object on it holding the arming lever in place.

A secret weapon, as reported in the January 1946 *Leatherneck Magazine*

> Sir: I have the scoop on the new secret weapon the Sixth Marine Division [occupying North China from 1945–46] has just put out. In fact, I have seen it many times. It is called the "M2 Sling Shot." It is a recoil operated hand weapon, may be shot from any position, single shot. Range and windage have not been determined. Its main use is to keep Chinese kids from infiltrating over the walls of the objective, which is the Marine Barracks. All credit for this weapon should go to the Colonel of Headquarters Battalion, Sixth Marine Division. (Name Withheld On Request)

In 1997 the Marine Corps was given proponency for the development and acquisition of non-lethal weapons for all the military services. It appears Corps had had long experience in this area.

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[70] Production of the MG.42 began in 1943. It is sometimes assumed that it largely replaced the MG.34. Actually the MG.34 was continued in production through the war, being produced from 1936–45. More MG.42s were actually built than MG.34s in its less than two-year production run, but they were comparatively scarce on the *Westfront* as most were sent to the *Ostfront.*

[71] The German 9mm MP.38 and MP.40 machine pistols are frequently and incorrectly called "Schmeissers."

[72] Dr Gatling was a medical school graduate who had never practiced medicine. He mainly designed agricultural equipment.

[73] The 1in Gatling cartridge (25x88mmR) threw an 8oz (227g) lead bullet. There were also canister rounds loaded with buckshot or cylindrical slugs.

[74] *Predator* is noteworthy, to a point, in that it is the only motion picture in which two of the actors became state governors, Arnold Schwarzenegger – California (2003–11) and Jesse Ventura – Michigan (1999–2003).

[75] The 20-round magazine-fed FG.42 was intended to replace the 7.9mm Kar.98k carbine and MG.34/MG.42 in the light machine gun role in *Fallschirmjäger* units. With only 6,000 of the expensive weapons produced, it simply became a supplemental squad automatic weapon augmenting machine guns and did not replace the Kar.98k.

[76] The snooperscope was an improved copy of the German *Zielgerät (Zg.) 1229 Vampir* (target device Vampire) mounted on 7.9mm StG.44 assault rifles, but only seeing very limited combat use from February 1945, mainly on the Eastern Front. It required a large and heavy backpacked power unit. It is frequently seen incorrectly designated the "Zf.1229," "Zg." being confused with *Zielfernrohr (Zf.),* the designation for standard rifle optical telescope sights.

[77] "Navy" models were used almost as widely by the cavalry and other soldiers as "Army" models.

[78] This practice was adopted on the pre-Civil War Texas frontier and used during the Mexican–American War (1846–48) and did not originate with the Confederate cavalry and partisan raiders as sometimes claimed.

[79] Probably changed as the common meaning of WASP was White Anglo-Saxton Protestants.

[80] It is accepted that the movie in which a sideways grip appeared and led to copycatting by criminals was *Menace II Society* (1993); the directors claim to have seen the side-grip used in a 1987 robbery. It had been seen in earlier movies including *One-Eyed Jacks* (1961) and *The Good, the Bad and the Ugly* (1966).

[81] The following two discussions address nuclear weapons. For comparison's sake the Hiroshima and Nagasaki atomic bombs yielded between 12.5- and 15-kiloton and 21-kiloton detonations, respectively. The Minuteman-III LGM-30G intercontinental ballistic missile, the only land-based ICBM remaining in US service, has a 1.2-megaton warhead. A kiloton (kt) is equivalent to 1,000 metric tons of TNT (trinitrotoluene). A megaton (mg) is equivalent to 1,000,000 metric tons of TNT.

[82] The battle group replaced both the infantry regiment and battalion as the divisional fire and maneuver unit with five per Pentomic division from 1958–1962. The battle group equated to a large battalion (a headquarters, a combat support, and five rifle companies). Pentomic is a contraction of "penta" – five – and "atomic"; an organizational and tactical doctrine structured for the nuclear battlefield. The concept proved extremely flawed and was abandoned.

[83] These were probably unclassified ranges and the actual classified range may have been somewhat further, perhaps up to a quarter more than the stated range.

[84] In most World War II armies flamethrowers were operated by assault engineers, aka sappers or pioneers depending on each army's traditions. One exception was the US Marine Corps, which began training infantrymen to operate flamethrowers in early 1944. They were assigned specialty serial number 535 – assault demolitionist – and were trained to operate flamethrowers, bazookas, and demolitions, so a "535" was not just a flamethrower operator. Selected regular riflemen were also trained to operate "Zippos" and received no specialty number.

[85] Conceivably, owing to loose record keeping, a soldier extending his tour by six months could have brought back two weapons, one when taking a 30-day tour extension leave and another at the end of the extension tour.

[86] It is often stated that the birdshot filled in the spaces between the larger buckshot, but this would be time consuming to load and it would be impossible to load consistently. So far as it has been able to be determined the buckshot was simply loaded atop the birdshot.

[87] Originally introduced as the .30 Winchester Center Fire in 1895, the idea of putting the Winchester name on its weapons was abhorrent to Marlin Firearms. They named it the .30-30 – a catchy designation – and it quickly became known as the .30-30 Winchester; even Winchester changed its

designation. The .30-30 spawned the .32 Winchester Special, .25-35 Winchester, and .219 Zipper. These rounds were the first American smokeless powder game cartridges and were introduced in the mid-1890s, even though some bore black powder designations.

[88] Winchester, the US Repeating Arms Company of New Haven, Connecticut, closed in 2006 after 140 years of producing legendary firearms. That same year the Olin Corporation, owner of the Winchester trademark, announced that Winchester firearms would continue to be made by the Browning Arms Company in Ogden, Utah, under the Winchester Repeating Arms brand. Browning Arms is owned by FN Herstal of Belgium. The "Winchesters" are actually produced at FN's US production facility in South Carolina where M16 rifles, M240 machine guns, and M249 squad automatic weapons are made.

[89] Weapons used in movies and television have "Hollywood blank adapters" permanently fitted (drilled and tapped) just inside the muzzle so that it appears to not have the usual externally fitted adapter or it is temporally fitted between the muzzle and flash suppressor.

[90] It should be noted that cartridges in magazines and ammunition pouches do not explode if struck by bullets. Nor will most high-explosive devices (grenades, demolition charges, HEAT warheads, etc.) owing to the stability of modern explosives such as Composition B and C4. However, the rocket motor of a LAW or AT4, for example, may detonate or burn if hit by gunfire.

[91] Supersonic exceeds the speed of sound (Mach 1). At a temperature of 70°F (21.1°C), the threshold value required for an object to be traveling at a supersonic speed is approximately 1,129ft/sec (344m/sec, 770mph, 1,238k/hr).

[92] These rare rounds were identified by one-third of case length and the bullet being lacquered green, but sometimes the entire case was lacquered green and the bullet was not color-coded.

[93] The De Lisle carbine, designed by William De Lisle in 1942, was based on a Lee Enfield No. 1 Mk III rifle action chambered for the normal subsonic .45 ACP, and developed for use by clandestine forces. It was provided with 7- and 11-round magazines – modified Colt M1911A1 pistol magazines – and fitted with a long, non-detachable silencer, the 8.27in barrel being that of a modified Thompson submachine gun (two-thirds of the silencer was merely a tube the bullet traveled through after leaving the barrel. Working the bolt was louder than firing the weapon. Only 129 were produced from 1942–45 and remained in service until 1965.

[94] Literally "armor-fist." *Panzerfaust* – singular, *Panzerfäuste* – plural.

[95] From the 1980s the USSR/Russia provided an official simple nickname to many weapons systems to allow poorly educated non-Russian speaking soldiers to remember it rather than a formal designation. The former USSR possessed almost 80 different languages and dialects. These nicknames were simply tags and did not describe a characteristic or feature.

[96] The 105mm RPG-29 *Vampir* (Vampire) appeared in 1989 and is a much different weapon than earlier RPGs and more similar to the US Marine Corps' 83mm Mk 153 Mod 1 Shoulder-launched Multipurpose Assault Weapon (SMAW). The Russian-designed 105mm RPG-32 *Hashim* was introduced in 2007 for use by Jordan. It is a small reloadable weapon with the rocket in a modular tube. These weapons are breech-loaded.

[97] Developed in 1944, it was called the RPG-6 as it was designed by the NII-6 Special Engineering Bureau.

[98] BM = *Boyevaya Mashina* – Battle Machine.

[99] If anyone knows of such an actual mine fuse and can document it, please contact the publisher. By documentation I mean the mine and fuse model designations, country of manufacture, characteristics, and illustrations from a valid publication, not someone mentioning it in their memoirs or a novel.

3.
AMMUNITION HISTORY AND FACTS

Ammunition – bullets – is that most important component of a firearm for which they exist to launch, but is often one of the most misunderstood aspects in the study of ordnance. One can be extremely knowledgeable of firearms, but without a solid grounding in their ammunition, one may not be able to employ the weapon to its full effectiveness or safely. This section seeks to provide a bit more information in order to aid your understanding.

Why is a SINGLE CARTRIDGE called a "ROUND?"

That term had its origins in the days when musket bullets were literally round lead balls. The term "bullet" itself is derived from the French words *boulette* – a small ball, and *boulet* – a missile, i.e., a projected object – not a modern rocket-propelled missile. Streamlined, elongated, conical-shaped muzzle-loading rifle bullets were introduced in 1859 in the form of the "minié ball" (pronounced "minnie ball"), which derived its name from the French *Minié Boulette.* This bullet design was named after its developer, French Captain Claude-Étienne Minié (pronounced "Min-ee-ay") (1804–79). In American service minié balls were also called "elongated balls." The Germans call a "round" a *Kugel* (ball) while in Spanish a bullet is a *bala* and can be translated as "bullet" or "ball."

Modern military "ball" ammunition refers to standard full metal jacket, solid-core bullets used for service firing against personnel, thin-skin vehicles, light field fortifications, unprotected materiel, etc. Lead cores are the most common as it provides the necessary weight. Steel cores are also used for improved penetration, but usually also have lead components for weight and balance. Special purpose bullets contain hardened armor-

piercing cores, incendiary compounds, tracer elements, or a combination of these.

A complete round is called a “cartridge,” a single unit comprised of the bullet, case, propellant, and primer. The “bullet” is also known as a “projectile” or “slug,” the latter not being entirely correct. A “slug” is defined as a solid lead, round bullet larger than buckshot (buckshot pellets are .24- to .33-caliber lead balls). Round full-bore slugs were used in shotguns for big game. Bullet-shaped rifled slugs were introduced in 1898 and the improved Foster slug appeared in 1931. By 1941 round slugs had fallen from use in shotguns.

FACT:
Speaking of round musket balls, in order to explain why rifled muskets were more accurate than smoothbore muskets, Bavarian philosopher Herman Moritz ignored mathematics and used a simpler explanation in an era when medieval beliefs were still prevalent. In 1522 he stated that as gunpowder was manifestly a devilish product, the balls flew through the air, hither and yon, impelled by small demons who sat astride them. It was equally self evident that if the ball was spinning rapidly, not even a demon could stay on it and thus it flew straight.

“Shells,” “shell casings,” “bullet casings,” and “hulls”

Cartridge cases have incorrectly been called “shells,” “shell casings,” “bullet casings,” “hulls,” or “brass.” **“Case” is the proper term**. A shell is actually an explosive-filled projectile such as an artillery projectile. However, “shotgun shell” or “shot shell” are generally accepted terms for shotgun cartridges. The worst violation is to call a complete round (cartridge) a “bullet,” “How many bullets you got left?” Its like calling a rifle a “gun,” it just ain’t done.

Metallic cartridge casings are typically made of brass – copper with some 30 percent zinc. Mild steel cases have been widely used, especially by Germany in World War II and by many Warsaw Pact states. To prevent rusting they are lacquered, usually in a dark green or gray color. Copper-washed steel cases have seen limited use. Prior to the 1870s cartridges were

made of copper. Brass cases provide better gas sealing and, while still pliable, are stronger than copper and can be more easily extracted from the chamber. Brass cases are better for reloading as they can be reused more often. Military cartridge cases are usually discarded in combat. In training the cartridges are recycled, but there is little effort to recover them from battlefields. Since they are only used once steel cases reduce the expenditure of brass, a valuable commodity in wartime. Nickel-plated brass cartridge cases are sometimes seen, especially among commercial .45 ACP, .38 Super, and .357 Magnum rounds. Accomplished by electroplating this was originally done to prevent verdigris, the green corrosion caused by humidity, especially when cartridges were placed in moisture-retaining leather belt loops.[100] Automatic pistol rounds were not carried in belt loops, instead being stowed in magazines. In such instances nickeled cases were more of a marketing ploy, but they also prevent tarnish and reduce cleaning needs if being reloaded. Zinc-coated (grayish color) brass cartridges served the same purpose. Aluminum and plastic cases with brass heads have been used for blanks and practice cartridges. Thousands of special blank rounds with plastic cases and cast metal heads were produced in France for the filming of *The Longest Day* (1962).

FACT:
As an aside, US Army trainees walking off rifle ranges declare to the drill sergeant, “No ammo, no brass, Sergeant,” meaning they were not keeping any live ammunition or empty cases as souvenirs. Those trying to be cute would declare in a slurred voice, “No ass, no grass, Sergeant.”

What do all those LETTERS AND NUMBERS on the base of small arms cartridge cases mean?

On US military small arms cartridge “heads” (base of the cartridge case) are found a two-digit number and a two to six-letter code. These are called “headstamps.” The author does not know how often people have told him that the ammunition production lot can be determined from the headstamp allowing ammunition to be “traced” back to its origin. This is not true, the

lot number is found only on packing cartons and boxes. US military headstamps normally provide only two items of information. The two-digit number is the year of manufacture at the 6 o'clock position and the two to six letters indicate the US Army plant or contracted commercial manufacturers' code at 12 o'clock. Such information does not allow loose cartridges to be "traced" or the lot number determined.

This may change in the future, however. In 2005 Brazil enacted laws requiring that certain popular calibers be stamped with a 10-digit code identifying if the ammunition was purchased by the armed forces, police, government agency, sporting clubs, private security, etc. plus its lot number. Germany does this only for the 5.56mm.

US military headstamp manufactures' codes currently in use include:

DM	Des Moines Ordnance Plant
FA	Frankford Arsenal
FC	Federal Cartridge Company
KS	Allegheny Ordnance Plant (Kelly Springfield)
LC	Lake City Ordnance Plant
M	Milwaukee Ordnance Plant
RA	Remington Arms
REM-UMC	Remington-Union Metallic Cartridge Company
SD	Sparklet Devices
SL	St. Louis Ordnance Plant
SMCO	Stant Manufacturing Company
TW	Twin Cities Ordnance Plant
U or UT	Utah Ordnance Plant
WCC	Western Cartridge Company
WRA	Winchester Repeating Arms Company
WF	Waterbury Ferris Company

NOTE: both WCC and WRA are now owned by Olin Mathieson Chemical Corporation.

Some of these plants are closed or on standby and not currently producing ammunition, but the cartridges are still in inventory stocks. There were dozens of other US military headstamp manufacturers' codes used in the past.

Additionally, most 7.62mm NATO and the new 5.56mm NATO rounds bear the circled cross NATO acceptance symbol in which case the acceptance symbol is at 12 o'clock, manufacturer's code at 8, and the year at 4.

Rounds may be found with additional markings, for example especially loaded match ammunition for competitive shooting and sniper rifles is marked "MATCH" or "NM" (National Match). "HP" for high-pressure test firing have nickel-plated or stannic-stained (silvered) cases (*never* fire HP rounds in service weapons). Early US headstamps often had different markings. Prior to World War I headstamps often included the month and year, 4 12 (April 1912) for example. Other information was provided, the .45-70 cartridge had "C" and "R" referring to carbine and rifle loads.

Foreign military ammunition is similarly headstamped, or in some cases given raised letters/numbers/symbols. One- to three-digit code numbers or alphanumeric codes may be used to identify the factory and occasionally other codes may provide special information such as the type or model of round, propellant, or case material. In some instances one-letter codes have been used to identify the production year. Soviet/Russian and Communist Bloc ammunition is often headstamped with a one- to three-digit factory code at the 12 o'clock position and a two-digit year at the 6 o'clock. Headstamp characters may be Western Latin, Cyrillic, Arabic, Hebrew, Oriental, or others. The caliber is sometimes included. *Deutschen Waffen- und Munitionsfabriken* (DWM) uses a two- or three-digit number, the case number (*DWM-nummer* or *Patronen №*), rather than identifying the caliber. Small stamped or raised symbols may be encountered such as stars, triangles, crosses or tick marks to identify arsenals, nationality, case material, special types of ammunition, or other information. Segment lines dividing the head into two to four equal segments may be encountered on older ammunition. No assumptions as to the meanings of foreign headstamps should be made as they vary greatly. Additional information can be found on some foreign ammunition. For example, British 0.5in Browning machine gun cartridge headstamps include the manufacturer's

initials, year produced, caliber, mark (model), propellant code, and code identifying the type of bullet.

US commercial ammunition usually has the caliber followed by a wide variety of words or abbreviations to further identify the specific cartridge at the 12 o'clock position, for example, 6MM REM, 218 BEE, 30-30 WIN, 303 BRIT, 308 WIN, 32 WCF, 357 MAG, 380 ACP, 9MM LUGER, 38 SPL, 44 S&W, 45 COLT, 45-70 GOVT, and the manufacturer's abbreviation at 6 o'clock. Note that the decimal point does not prefix the caliber, although examples of such will be seen. If "+P" is marked on commercial cartridge headstamps they are loaded to a higher pressure and can be used only in firearms designated for this cartridge and recommended by the manufacturer (+P ammunition is loaded with a heavier high-velocity charge and should not be confused with military high-pressure test ammunition). Commercial ammunition is not marked with the year of manufacture. Foreign commercial headstamps are often similar to US practices since ammunition is increasingly being marketed worldwide. European ammunition may be marked with the caliber and case length in millimeters, for example, 8.58X71MM, which in the United States would be headstamped 338 LAPUA MAG.

The .22-caliber rimfire cartridges (.22 Long Rifle, .22 Short, etc.) usually have a single letter in the center of the head identifying the manufacturer. The caliber is not marked on the head. Interestingly, until 2006 (also from 1969–81) Winchester-produced rimfire cartridges were identified by an H in honor of Benjamin T. Henry (1821–98), who invented the .44 Henry Flat rimfire cartridge in 1860 for Henry Winchester lever-action rifles. This round is considered one of the milestones in modern cartridge development. Prior to the introduction of modern inserted pocket primers in the late 1860s, rimfire cartridges were used and continued to be widely used into the late 1800s.

The primer annulus – rim of the primer pocket – is often weather-sealed with colored or clear lacquer or varnish, as is often the mouth of the case. Some countries have used different color annulus lacquer or colored case mouth bands for special purpose cartridge identification in lieu of or in conjunction with colored bullet tips.

Use of EXPANDING BULLETS

As mentioned above, the use of soft-point, hollow-point, or other types of expanding bullets is prohibited from use against enemy combatants. This prohibition is addressed in the Hague Convention of 1899 and 1907, which states, “It is especially forbidden to employ arms, projectiles, or material calculated to cause unnecessary suffering” (Article 23, paragraph (e)). This is interpreted by the US as, “Usage has, however, established the illegality of the use of lances with barbed heads, irregular-shaped bullets, and projectiles filled with glass, the use of any substance on bullets that would tend unnecessarily to inflame a wound inflicted on them, and the scoring of the surface or the filing off of the ends of the hard case of bullets.” The precedent for this prohibition dates back to the Declaration of St Petersburg of 1868 (IV, 3), which prohibited the use of unusually shaped musket balls to inflict more serious injuries.

Apparently the phrase “irregular-shaped bullets” in the US interpretation means soft-point, hollow-point, and other types of expanding bullets although this is not made entirely clear in the document’s language. The phrase “filing off of the ends of the hard case of bullets” refers to what were originally known as “dum-dum” bullets. (“Hard case” is an old term for full metal jacketed bullets.) A dum-dum bullet is made by filing off the tip of a full metal jacketed bullet to expose its lead core thus essentially creating a soft-point, expanding bullet. The practice was begun by the British at Dum Dum Indian Army Arsenal near Calcutta. These .303in Mk II Special cartridges were used in West Bengal in 1895, Sudan in 1897–98, and by both sides during the Second Boer War (1899–1902) in Lee Metford and Lee Enfield rifles. The Mk III and IV rounds were hollow points. Even military journals of the period criticized their use as inhumane. The Germans apparently used manufactured 9mm hollow-point Lugar pistol ammunition in their African colonies prior to World War I. In 1898 the British issued the .455 Webley Mk III “Manstopper” bullet, a hollow-point for use by the police and in colonies. Dumdum bullets are also known to have been used by US troops armed with .30-40 Krag rifles during the 1899–1913 Philippine Insurrection in an effort to stop fanatical charging Moros. These were not purpose-manufactured cartridges, but the bullet noses were X-cut by the troops. This may also have been done with lead .38 Colt revolver cartridges. The first purpose-made cast lead hollow-point bullets were introduced in 1890 in .32-20, .38-40, and .44-40 Winchester cartridges.

One story of the dum-dum name's origin claims that it came from the American prohibition gang wars of the 1920s. Thompson submachine guns firing normal ball rounds were said to go, "rat-tat-tat" while those firing bullets with the tips filed off went "dum-dum-dum," which is plain dumb, untrue, and not the term's origin. The practice is actually dangerous with modern high-velocity cartridges in that when fired the bullet's core may separate from the jacket to continue down the barrel while the jacket expands and jams in the barrel to catch the following bullet.

"Scoring of the surface" means filing longitudinal grooves in the bullet jacket. The idea is that the bullet will shatter upon penetrating the body. The dum-dum and scored bullets usually worked in early bolt-action rifles, but modern high-velocity bullets so modified will breakup or strip off the jacket in the bore.

In World War II on New Britain Island the Japanese carefully removed 6.5mm bullets and reversed them in the cartridge case. They could be fired in bolt-action rifles, if carefully ensuring they did not misfeed when chambered, but could not be fired in automatic weapons. The full-jacketed bullets had a lead core of which the base end was exposed, a characteristic common to most jacketed bullets. They thought this provided a "soft-point" expanding bullet. US tests with Japanese cartridges loaded in this manner showed that the bullet did not expand and that accuracy suffered seriously at all but the shortest ranges. The bullets would have a high probability of key-holing, i.e., striking sideways, upon impact. They would be more easily deflected by brush and bamboo. One should *never* attempt this with any ammunition.

In Vietnam there were instances where three or four 1/16in (1.58mm) diameter holes were drilled in the nose of 12-gauge rifled slugs so they would break up or expand on impact, which may or may not have occurred; probably not as the tiny holes would fail to cause expansion or break up the heavy lead slug. This is of course illegal, but it is also an example of a solution to a problem that did not exist. If a 440-grain (28.5g, almost 1oz) lead rifled slug will not stop a man at shotgun-range, expanding or breaking-up the slug upon impact will not either.

When the Soviet Union introduced the 5.45x39mm 7N6 ball cartridge for the AK-74 assault rifle in the mid-1970s there was some controversy regarding the design of its bullet. It has a small air space inside the bullet tip backed by a small lead slug, then a mild steel core. The steel core was to

improve the bullet's penetration; the lead slug was for weight, and the air space for balance. It was not intended to deform and inflict unnecessarily grievous wounds. Its full-jacketed bullet is in compliance with the Hague Convention.

The US has issued "hollow-tip" 7.62mm match rounds to snipers in Vietnam and since. This was not intended to "cause unnecessary suffering," but for accuracy. Hollow-tip bullets are proven to be more accurate than full metal jacketed ball rounds and have long been used in marksmanship competition. The justification for the issue of such rounds was that the bullets were not "modified" by alternating ball rounds; they were factory-produced. Additionally the hollow-tip does not pierce the jacket and expose the lead core, which is what is required to be an actual hollow-point and cause expansion. The "hollow" is merely a tiny hole in the tip of the jacket. The even more accurate 7.62mm M852 match round likewise has a small open-tip and is authorized for combat sniper use. The full-jacketed 7.62mm M118 rounds can be used for combat sniping. (See "Is the 7.62mm M118 match cartridge, an open-tip bullet, illegal to use against personnel?")

During the Vietnam War antiwar activists claimed that the 5.56mm M193 ball round for the M16A1 rifle was "technically a dum-dum bullet" because of its inherent yawing and tumbling effect when it strikes a person. This is totally incorrect. No law of war prohibits tumbling or unstable bullets, and most small-caliber, high-velocity bullets are inherently unstable after impact. It cannot be prevented. To be a dum-dum the bullet has to be *modified* in some manner to cause it to be more damaging to humans. (See "M16 rifle bullets tumble in flight" below.)

Technically, expanding bullets may be used against terrorists and civilian criminals in the US, however. This has been approved by the US Department of Justice for the following three reasons: 1) an expanding bullet will cause a more immediately serious wound to the target to prevent him from inflicting harm on others than if he had received only a lighter wound; 2) the bullet will seldom penetrate through an individual to wound innocents; and 3) misses will expand when they hit walls, car bodies, etc. and not generally penetrate through multiple walls to hit innocents. The US armed forces use the 9mm Mk 243 Mod 0 jacketed hollow-point bullet in 9mm handguns for military law enforcement (military police on army posts for example), but it is authorized for use only in the United States and its territories. The Department of Defense has chosen to comply with the

Hague Convention in regards to ammunition used against terrorists, especially outside the United States. The FBI and Customs and Border Protection issues .40 S&W jacketed hollow-point ammunition for pistols and submachine guns. Many police departments and other law enforcement agencies use jacketed hollow-point ammunition. Regardless of the foregoing discussion, armed forces personnel should not use expanding bullets unless authorized by their chain of command.

Exploding small arms bullets were outlawed in the Declaration of St Petersburg of 1868. Machine gun incendiary rounds are not considered explosive bullets. Spotter rounds, which create a flash upon impact, actually a small explosion, are not prohibited as they are not fired intentionally at personnel, but are used to observe where the projectile for a larger caliber antiarmor or anti-bunker weapon may strike for ranging purposes.

The following is a September 23, 1985 finding by the US Army Special Operations Command on the use of "dum-dum" bullets:

> The principal provision relating to the legality of weapons is contained in Art. 23e of the Annex to Hague Convention IV Respecting the Laws and Customs of War on Land of 18 October 1907, which prohibits the employment of "arms, projectiles, or material of a nature to cause superfluous injury." In some law of war treatises, the term "unnecessary suffering" is used rather than "superfluous injury." The terms are regarded as synonymous. To emphasize this, Art. 35, para. 2 of the 1977 Protocol I Additional to the Geneva Conventions of August 12, 1949, states in part that "It is prohibited to employ weapons [and] projectiles … of a nature to cause superfluous injury or unnecessary suffering." Although the US has made the formal decision that for military, political, and humanitarian reasons it will not become a party to Protocol I, US officials have taken the position that the language of Art. 35(2) of Protocol I as quoted is a codification of customary international law, and therefore binding upon all nations. The terms "unnecessary suffering" and "superfluous injury" have not been formally defined within international law. In determining whether a weapon or projectile causes unnecessary suffering, a balancing test is applied between the force dictated by military necessity to achieve a legitimate objective vis-à-vis suffering that may be considered

superfluous to achievement of that intended objective. The test is not easily applied. For this reason, the degree of "superfluous" injury must be clearly disproportionate to the intended objectives for development and employment of the weapon, that is, it must outweigh substantially the military necessity for the weapon system or projectile. The fact that a weapon causes suffering does not lead to the conclusion that the weapon causes unnecessary suffering, or is illegal *per se.* Military necessity dictates that weapons of war lead to death, injury, and destruction; the act of combatants killing or wounding enemy combatants in combat is a legitimate act under the law of war. In this regard, there is an incongruity in the law of war in that while it is legally permissible to kill an enemy combatant, incapacitation must not result inevitably in unnecessary suffering. What is prohibited is the design (or modification) and employment of a weapon for the purpose of increasing or causing suffering beyond that required by military necessity. In conducting the balancing test necessary to determine a weapon's legality, the effects of a weapon cannot be viewed in isolation. They must be examined against comparable weapons in use on the modern battlefield, and the military necessity for the weapon or projectile under consideration. In addition to the basic prohibition on unnecessary suffering contained in Art. 23e of the 1907 Hague IV, one other treaty is germane to this review. The Hague Declaration Concerning Expanding Bullets of 29 July 1899 prohibits their use in international armed conflict:

"… of bullets which expand or flatten easily in the human body, such as bullets with a hard envelope which does not entirely cover the core or is pierced with incisions."

The US is not a party to this treaty, but US officials over the years have taken the position that the armed forces of the US will adhere to its terms to the extent that its application is consistent with the object and purpose of Art. 23e of the Annex to the Hague Convention IV, quoted above.

Can COMMERCIAL AMMUNITION be fired in MILITARY WEAPONS?

Commercially-produced small arms ammunition can be used in military weapons if necessary. It must be noted that commercial ammunition will not always operate effectively in all automatic weapons due to differences in propellant loadings and bullet shape, the latter of which may affect feeding if a sporting load, especially if shorter than standard military bullets. Chambering problems and pressure limitations of different cartridges will vary with the different weapons in which they are used. US commercial and European designations of standard US military ammunition are different from US military designations, e.g., "cartridge, 5.56mm, ball, M885." In Europe and throughout most of the world metric designations are used for ammunition (which is discussed below). In the past the British often used US commercial-type caliber designations with a "0" prefix and sometimes followed by "-inch," e.g., 0.5in Browning or 0.38in Special. The British now mainly use metric designations, although sporting ammunition will usually be identified with US-style commercial designations. Remember that "hunting" ammunition with soft-point, hollow-point, or other types of expanding bullets are prohibited from use against enemy combatants.

US military designation	US commercial designations	European designations
5.56mm[1]	.223 Remington, 5.56mm NATO	5.56x45mm[3]
7.62mm[1]	.308 Winchester, 7.62mm NATO	7.62x51mm[3]
.30-caliber[2]	.30-06 Springfield, thirty-nought-six	7.62x63mm (0.30inch in UK)
.30-caliber for carbine	.30 Carbine	7.62x33mm
9mm	9mm Parabellum, 9mm Luger	9x19mm
.45-caliber	.45 ACP, .45 Auto	11.43x23mm (0.45inch

		Colt in UK, 11.25x23mm in some countries, 12mm by VC/NVA)
.50-caliber	.50 Browning, .50 BMG[4]	12.7x99mm (0.5inch Browning in UK)

1. Technically there are extremely minute case dimension differences between military 5.56mm and .223 Remington, and 7.62mm and .308 Winchester cartridges, but they can be fired safely in either weapon. Some types of civilian bullets though may not feed as well as military ammunition.
2. For rifles and machine guns and not the carbine. Much current commercial production .30-06 hunting ammunition has extremely hot loads and it is recommended that it not be fired in M1 Garand and earlier .30-06 bolt-action rifles. Some companies produce safer loads for these weapons and are designated ".30-06 Garand."
3. The French designate NATO standard rounds the 5.56mm and 7.62mm OTAN (*Organisation du Traité de l'Atlantique Nord*).
4. BMG = Browning Machine Gun.

What does "ACP" mean in regards to the .45-caliber M1911A1 pistol cartridge?

The .45 ACP means **Automatic Colt Pistol**. It is not a military designation, but a commercial label given to a widely used family of cartridges designed by John M. Browning (1855–1926) for Colt-Browning and FN-Browning pistols developed just before and after 1900. They are pretty much considered to be worldwide standard cartridges and have since been used in a variety of military and commercial pistols and some in submachine guns.

US designation	Year	Alternate designations
.45 ACP	1905	.45 Auto, 0.45in Colt (UK), 11.43x23mm,[1] 11.25mm (German), 11.3mm

.38 ACP	1897	.38 Auto, .38 Browning, .38 Super,[2] 9x23mmSR (actually .356-caliber)
.380 ACP	1908	.380 Auto, 9mm Browning, 9mm Short, 9mm Kurz (German for short), 9mm Corto (Italian for short), 9x17mm
.32 ACP	1899	.32 Auto, 7.65mm Browning, 7.65x17mmSR (actually .308-caliber)
.25 ACP	1906	.25 Auto, 6.35mm Browning, 6.35x15.5mmSR

1. In some countries (France, Italy, and Mexico among others) it is illegal to privately own weapons of military calibers. Owing to the demand for a weapon in the .45 ACP range, the .45 ACP Short (11.43x22mm) was developed. It has a 1mm shorter case than the standard round and offers almost identical performance. Only a pistol's barrel needs to be changed to accommodate the short round. It will not accept the standard round thus meeting the letter of the law. With the consolidation of firearms laws in the European Union this law may be revoked and the need for this little used round will disappear.
2. The .38 Super, introduced in 1929, essentially replaced the .38 ACP being a higher velocity load. Higher powered .38 Super ammunition should not be fired in .38 ACP handguns even though they will chamber as it too is 9x23mmSR. There are two other designations for 9x23mmSR cartridges, the differences being the loads and bullets: 9mm Bergmann-Bayard (1910, aka 9mm Largo) and 9mm Steyr (1912). To add to the confusion there was also a little used 9mm Browning Long (9x20mm Browning), shorter than a .38 ACP and longer than a .380 ACP. The 9mm Browning Long was developed in 1903 by John Browning, but is not part of the ACP-series and was not made in the US.

FACT:
As an aside, the head size (rim diameter, extraction groove dimensions) of the .45 ACP, .30-06 Springfield, 7.62mm NATO, and German 7.9x57mm and 7.9x33mm Kurz are essentially the same.

A rimmed version of the rimless .45 ACP was commercially developed for use in Colt and Smith & Wesson M1917 revolvers, which were released to sell to civilians after the war. These revolvers, adopted as substitutes for the M1911 automatic pistol owing to handgun shortages during the army's World War I expansion, used .45 ACP rounds with spring steel "half-moon" three-round clips. The .45 Auto-Rim (Automatic-Rimmed, aka ".45 AR") developed in 1920 did not require the clips, but of course each round had to be loaded singly as with other revolvers. The .45 Auto-Rim rounds cannot be loaded in magazine-fed pistols and were never used by the military.

Metric and British CARTRIDGE DESIGNATIONS

European cartridges are designated in millimeters with individual rounds identified by caliber, case length, and in some instances an identifying letter for the type of rim. This would appear, for example, 7.62x51mm, the 7.62mm NATO round. The Soviet 7.62mm rifle and machine gun round is the 7.62x54mmR. Rimless cartridges do not have a rim type identifying letter. They have an extractor groove and the rim is the same diameter as the cartridge base. The letters are:

R	rimmed – a prominent flange-like rim without an extraction grove.
SR	semi-rimmed – extractor grove with a rim slightly wider than cartridge base
RB *or* RR	rebated rim – extractor groove with a rim smaller in diameter than cartridge base.
B	belted – rimless cartridge with a reinforcing band above the extractor groove.

It is common for rounds to also be identified by their caliber in millimeters and a name, such as 9mm Parabellum and 7.65mm Mauser. They may also be informally identified by nationality, for example, 6.5mm Japanese (6.5x50mmSR), 6.5mm Italian (6.5x52mm), 6.5mm Dutch *or* Romanian (6.5x53mmR), 6.5mm French (6.5x53.5mm), 6.5mm Greek (6.5x54mm), 6.5mm Swedish *or* Norwegian (6.5x55mm), and 6.5mm Portuguese

(6.5x58mm). They were also identified by the principal military rifle make in which they were used, e.g., 6.5mm Arisaka for the 6.5mm Japanese. From the 1890s, and earlier, through World War II it was a matter of national pride for every country to have its own rifle/machine gun cartridge. The same applied to revolvers.

The British and Commonwealth used hundredths of an inch caliber designations usually stated as a three-digit number (1mm = 0.03937in). "Calibre" is not included in the designation, but rather "inch" (in). An example is .303in, commonly called the .303 British or .303 Enfield. Often the "inch" is not used; it is simply stated as ".303." A revolver cartridge was the .380in Enfield, but British service men usually just called it a ".38." It was also known as the .38/200, the second number being the bullet weight. Often for larger caliber cartridge designations an "0" prefixed it, for example, 0.5in for the .50-caliber machine gun round. The British now designate all military ammunition in the metric system, which they adopted nationwide in 1965. Their latest adopted round is the 8.58mm (Finnish .338 Lapua Magnum – 8.58x71mm, aka "8.6x70mm") used in the L115A1 and L115A3 Large-Calibre Long-Range Rifles (LCLRR), the military versions of the Accuracy International AWSM sniper rifle known to the troops as the "Big Rifle" or "Big Gun." (AWSM = Arctic Warfare Super Magnum, which does not mean it is limited to that environment).

Why are many older cartridges identified by TWO-NUMBER DESIGNATIONS?

Prior to the turn of the 20th century two double-digit – three-digit in some cases – numbers separated by a hyphen identified many American small arms cartridges, especially rifle-caliber, .25-20, .30-30, .38-40, .45-70, and .50-115, for example, and were usually followed by the manufacturer's name or some other identifying word. The first digit is the cartridge's bullet caliber in hundredth of an inch (usually rounded out) and the second is the weight of black powder propellant in grains. Even after smokeless powder was introduced just before the turn of the century some newly developed cartridges were still designated with the two-number system even though they were loaded only with smokeless propellant; the .30-40 Krag, for example, adopted by the US Army in 1892.[101] It was never loaded with

black powder, only smokeless. The “40” was the black powder equivalent of its smokeless propellant loading. The famous .30-30 Winchester was also loaded with smokeless powder, but in this case the second “30” was apparently the sole instance when it meant 30 grains of smokeless powder and not black powder. Some exceptions will be found, such as the .30-06, in which the second digit has another meaning, but that’s a different story.

Some cartridges were identified with a three-number system, for example the .45-70-500 and .45-70-405. The third number indicated the bullet weight in grains. In the case of the different .45-70 Government (aka .45-70 Springfield) loadings, the 405-grain bullet was the first issued in 1873. In 1882 the 500-grain bullet was adopted to achieve longer range. There was also a .45-55-405 dating from 1873, which had the lighter bullet plus a much lighter powder charge for carbines in order to reduce the recoil. All three rounds were interchangeable in any of the weapons, but a rifle’s sight would not have been graduated for the carbine’s lighter bullet and charge and vice versa.

Earlier than this when muzzle-loading ammunition was used, paper or linen cartridges and balls (even pointed bullets were called balls) were identified on cartons and packets by the make of the weapon and the caliber designated, for example, “Calibre 52-100 for Sharps Carbine,” meaning 52/100th of an inch caliber; often without the decimal point.

Another early two-digit cartridge designation oddity was the “.56” Spencer rimfire series of the 1860s. The *first* “56” in the designation is the diameter of the base of the cartridge above the rim. The *second* number is not the propellant weight, but the bullet’s caliber and it was available in four chamberings: .56-56, .56-52, .56-50, and .56-46. The cartridge base diameter was 0.560in on all of these, but the cases tapered to the smaller calibers were identified by the second number. The .56-50 could be fired in .50-70 Springfield rifles.

What is a 5-in-1 BLANK cartridge?

This is a blank cartridge intended to be fired in five different weapons. Developed in the 1930s by Remington and movie “gun hire” companies, it was mainly used in motion pictures, specifically Westerns, leading to them being called “movie blanks” or “Hollywood blanks.” The cartridge could be

fired in the Winchester Model 1892 carbine chambered for the .38-40 or .44-40 Winchester,[102] revolvers chambered for the same rounds (these cartridges were popular in the Old West as a man could have a lever-action carbine and revolver using the same ammunition), and .45 Colt revolvers. It will chamber in the .44 S&W Special if the rim is ground down slightly and, although not originally designed for them, the 5-in-1 can also be used in .44 Remington Magnum revolvers and .410 shotguns too. They were typically headstamped REM-UMC 5-IN-1 (Union Metallic Cartridge Company, a Remington subsidiary) and also WRA 5-IN-1, if made by Winchester. Today 5-in-1 blanks are available with plastic cases. They may be loaded with black powder to generate more smoke for visual effect. They are also loaded with "full loads" (extra loud) and "half loads" when gunshot sounds are dubbed in.

Did US Special Forces actually "salt" VC and NVA ammunition stocks with EXPLODING CARTRIDGES?

It is often heard that Special Forces reconnaissance teams inserted ammunition that had been modified to explode in a weapon into Viet Cong and North Vietnamese Army ammunition stocks. Is this story true and if so, how was it done?

Project Eldest Son, Italian Green, or Pole Bean (depending on the period) is a fact. Military Assistance Command, Vietnam Studies and Observation Group (MACV-SOG) reconnaissance teams were sometimes given small amounts of "modified" ammunition to infiltrate into enemy controlled areas during the course of their "normal" reconnaissance missions. This usually consisted of one or two 82mm mortar rounds, two or three loose 12.7mm machine gun rounds, and one or two 10-round stripper clips of 7.62x39mm AK/SKS rounds with only one exploding cartridge in each clip. Occasionally an entire 550-round can of 7.62mm AK/SKS ammunition might have been inserted, but only a few rounds were explosive as was one round in a three-round wooden box of 82mm mortar rounds. Ammunition also entered the enemy supply system through the construction of false caches in areas known to contain real ones.

The exploding cartridges were filled with a PETN-like (pentaerythritol tetranitrate) powder that appeared no different from the normal propellant in

the event that they were disassembled for inspection in an effort to determine how the exploding cartridges were made. PETN is used in blasting caps and detonators. The rounds detonated with 250,000lb per square inch pressure. AK rifles and RPD machine guns could deal with chamber pressures of 45,000lb per square inch. This would totally shatter the weapon and send the bolt flying rearward. The doctored ammunition was not surreptitiously marked in any manner to differentiate it from safe ammunition. The reworked mortar rounds had a nose fuse that would detonate when the round struck the firing pin in the bottom of the tube. In all 11,565 7.62mm rounds, 556 12.7mm rounds, and 1,968 82mm rounds were "modified."

The project was undertaken because the six to nine-man recon teams could not move or fly out discovered ammunition caches. Attempts to fly in reaction forces to secure the sites (which were seldom near landing zones) and haul the sometimes tons of bulk ammunition out – a time consuming and manpower intensive effort – would have drawn an enemy response and resulted in costly battles in enemy controlled territory plus possibly losing helicopters. Blowing up the caches only scattered a great deal of still useable ammunition about that could be recovered by the enemy and also alerted the enemy to the team's presence. Nor was it practical for already overburdened teams to carry substantial demolition materials. Booby-trapping caches did little good either; even if a cache was blown up many unharmed cases of ammunition survived.

The idea of exploding ammunition was not new. In the late 1890s the British had slipped such ammunition in rebel stocks in former Rhodesia. They did the same in Afghanistan in the 1930s and in Malaya in the late 1940s.

In August 1967 tests were conducted on Okinawa. The insertion of the "tainted" ammunition began in early 1968. A recon team would leave rounds along a trail used by the enemy so that they appeared to have been carelessly dropped by their comrades. They would also insert a round into the magazines of dead enemy. The mortar rounds were "dirtied" in advance so that they appeared to have been there a while. It was also planned to insert boxes of mortar rounds in areas that had been blasted by B-52 bomber *Arclight* strikes. The enemy would search these areas for salvageable materials. The recon teams were supposed to report the drop-off location's 10-digit grid coordinates, which located it to within one

meter, a virtually impossible feat on a 1:50,000 scale map in pre-GPS days. If they were picked up and used by the enemy it was fatal or at least caused serious injury to the firer and perhaps to others nearby as well as destroying the weapon.

There were occasions where enemy soldiers were ambushed and an AK magazine was switched with the one on the dead soldier and it would contain a single ELDEST SON round. Only a single round was inserted in such a magazine so that an unexploded round would not be discovered if the remaining ammunition was examined. The main goal was to undermine their faith in China, which provided much of their ammunition and weaponry. It did not have to happen too often before word quickly spread and had a different psychological impact on enemy forces making them hesitant to use ammunition that had not been under their unit's control. Forged documents were also left about to help convince the VC/NVA that their weapons and ammunition were unsafe – a "Black psychological operation." Some units would only accept ammunition in sealed crates or cans. American authorities also warned US troops not to use captured ammunition. A warning was published in a 1969 issue of *Army Times*:

> **Enemy Has 2nd Chance to Kill**
> U.S. officials are again warning troops in Vietnam about the danger of using captured enemy weapons. Numerous incidents have caused injury and sometimes death to the operators of enemy weapons, the Combined Material Exploitation Center [CMEC] in Vietnam says.
>
> It reports "analyses of damaged enemy weapons have revealed that possible defective metallurgy in many cases leads to fatigue cracks in the firing surfaces which cause the weapons to explode." Faulty enemy ammo is also causing problems, so don't give Charlie a second chance to kill, CMEC says.

CMEC was not aware of the exploding ammunition though and thought they were warning troops of defectively made ammunition. However, few, if any, of these accidents were caused by "doctored" ammunition.

In mid-1969 the *New York Times* and *TIME* magazine leaked the existence of the project and the codename was changed to ITALIAN GREEN and then to POLE BEAN. With the project compromised, efforts

were made to insert as much of the ammunition as possible, but the NVA were learning to be suspicious of unknown caches, which in itself was a beneficial accomplishment. The project was cancelled later in 1969.

Was there really a PILOTED AIRCRAFT that aerial machine gunners could FIRE AT FOR PRACTICE?

This was **Operation *Pinball***, which began with the development of .30-caliber frangible bullets made of compressed powdered lead and Bakelite, a compound developed at Duke and Princeton Universities. The 107-grain frangible bullets were dark gray with the M22 (T44E1) ball being identified by a green tip and white band. The light bullets were designed to shatter upon impact. The .30-caliber was used rather than the .50-caliber normally arming bombers as the larger caliber, even with a frangible bullet, would inflict too much damage on the target aircraft and the ammunition would have been more costly. A requirement was that the bullet must not be able to penetrate aircraft aluminum at over 80yd. The Browning .30-caliber AN-M2 machine guns with T9 muzzle boosters (to increase the recoil of lighter weight frangible bullets) could be fitted on flexible mounts and in turrets in the place of .50-calibers. The idea was to train gunners aboard bombers at the US Army Air Forces' flexible gunnery schools. The AN-M2 machine guns had to have their sights recalibrated to allow for the lighter frangible bullet's different trajectory and lower velocity. The guns frequently jammed owing to bullets crumbling during feeding. The target aircraft was another matter.

The Bell P-63 Kingcobra fighter (derived from the P-39 Airacorba) was selected and extensively modified as the RP-63 "Pinball" – 100 RP-63As, 200 RP-63Cs, and 32 RP-63Gs were built by converting existing airframes. The Kingcobra was selected as it was the only production fighter aircraft not in demand in combat zones by the USAAF. They were being produced mainly for Lend-Lease to the USSR.

RP-63 modifications were extensive. The armament and armor were removed to reduce weight, the forward fuselage aluminum panels were removed and replaced by thicker protective sheet aluminum, thick bulletproof glass replaced the normal canopy (1.5in [38mm] front, 1in [25mm] sides), dorsal air intake protection was added, over 100 small

microphones were placed throughout the aircraft under the skin to detect hits, a hit-counter was installed in the cockpit, and a red light fitted on the propeller hub in place of the 37mm cannon to flash when hits were scored.

Training using the frangible bullets and Pinball aircraft began in April 1945 at the seven flexible gunnery schools. Besides being used as targets, the Pinballs were also employed as tugs to tow target sleeves. As "attacking" Pinball fighters peeled away from bombers full of eager gunner trainees, they sometimes took hits in wing-root oil coolant radiators resulting in wheels down forced landings because of overheating caused by damage. There were also instances when standard ball ammunition was inadvertently mixed in with the frangible. One Pinball pilot experienced cracks from bullet hits on his 38mm thick windshield. Owing to the introduction of jet aircraft and remote-controlled turrets on new bombers, the program was terminated in 1948. The Pinball aircraft were modified and redesignated as QF-63 Kingcobra remote-controlled target drones. They were never used as such and were eventually scraped.

Why did the US Army issue .22 RIMFIRE TRACER AMMUNITION?

During the funding-lean pre-World War II years the US Army was strapped for adequate stocks of training ammunition. The ammunition necessary to qualify riflemen was comparatively low, but the amount of ammunition required to train and qualify machine gunners was a different matter, especially aerial gunners. Prior to World War II the army contracted David "Carbine" Williams to develop a subcaliber adapter capable of firing low-cost .22 Long Rifle M24 rimfire ammunition. This resulted in the M1 machine gun trainer. It was provided with special web belts in which .22 Long Rifle rounds were inserted, however these caused frequent jams and misfeeds. It required numerous parts to be replaced in the gun to adapt it to .22-caliber ammunition and it could not be returned to a state in which it could fire .30-caliber ammunition quickly.

New machine gun trainers were developed by Springfield Armory in 1940 with a .22-caliber barrel, special bolt, and a few small replacement parts for the feed system. They could be converted from caliber-to-caliber easily and quickly. The small .22-caliber web belts were replaced by two-

piece .30-caliber cartridge sized adapters and standard .30-caliber web belts were used. These were the M3 trainer for the M1917A1 water-cooled, the M4 trainer for the M1919A4 air-cooled, and the M5 trainer for the AN-M2 aircraft Browning machine guns.

Standard .22 Long Rifle ammunition was used in these guns. The US Army Air Forces needed tracer ammunition to train aerial gunners in tracer-aiming techniques. In order to compensate for tracer cutback the USAAF worked on an optical illusion making it appear that tracers fired from a moving aircraft curved in flight, both while ground-firing at model aircraft mounted on a tall pole on a moving jeep and aerial firing from training aircraft at target sleeves towed by target tugs. A tracer round was developed, which provided a brief red trace. They used lead bullets just as .22-caliber ball ammunition and were identified by a pale red bullet tip.

How are the GAUGES OF SHOTGUNS determined?

The caliber or bore diameter of shotguns is determined by the diameter of a single ball equaling the diameter of the bore after forming a number of identically sized balls from one Imperial Libra pound (453.6g) of lead. For a 12-gauge shotgun the pound of lead has been formed into 12 equalsized balls (the result can vary depending on what value is used for the density of lead). Thus, the larger the gauge number the smaller the caliber of the bore – see table below. Common US shotgun gauges are 10-, 12-, 16-, and 20-gauge with the 12- and 20-gauges being the most popular. What is not realized by many is that in the Old West the 10-gauge shotgun was very widely used – “Doc” Holliday of O.K. Corral gunfight fame carried a sawed-off Belgian-made Meteor 10-gauge – “street howitzer.” (By the way, the gunfight with the McLaurys and Clantons actually occurred on the opposite side of the block from the O.K. Corral.) Eight-gauge shotguns saw some popularity too. The 4-, 8-, 14-, 24-, 28-, and 32-gauge were popular in the States and Europe to varying degrees in the past, but are virtually unheard of today, the “lost gauges.” Shotguns larger than 10-gauge have been outlawed for hunting in the US since 1918.

From 1922 there were 14½-gauge Greener Mk I and II police shotguns using a .577/450in[103] Martini-Henry single-shot, drop-block action, modified from old service rifles. The idea was that this odd British gauge

prevented stolen guns from being used as the shells could not be privately purchased. It was circumvented by merely wrapping a smaller 16-gauge shotshell with a few layers of paper or tape, and the problem was countered by developing a new shotshell in the late 1930s. This new round for the Greener Mk III police shotgun was an all brass case slightly bottlenecked down to 14½-gauge. Additionally it had a circular groove in the head encircling the primer. On the face of the breech plate on either side of the firing pin were two fixed studs that fit into the groove. This prevented paper-wrapped smaller shells from being loaded. Most of these shotguns, produced until 1964, were issued to prison guards and the Egyptian police, but also served in many British colonies. They were commonly known as "Egs," Egyptian guns.

The British-developed gauge system is also used in Europe, e.g., *12 Gauge Schrotflinte* in Germany, although the British usually call it "12 bore." Older shotshells were sometimes headstamped, e.g., "No. 12," but they were seldom called such. Caliber is also used to designate shotgun gauges in some countries, for example, the French call it a *calibre 12 fusil de chasse* (hunting gun).

The mathematical formula for determining gauge is:

$$d_n = \left(\frac{6 \times 453.59237 \text{ g}}{11.352 \text{ g/cm}^3 \times n \times \pi} \right)^{1/3} = 42.416 \text{ mm} \times n^{-1/3}$$

However, it might be easier to simply use this table:

Gauge	Caliber	Millimeter
4-gauge	0.935in	23.79mm
8-gauge	0.835in	21.21mm
10-gauge	0.775in	19.69mm
12-gauge	0.729in	18.53mm
14-gauge	0.693in	17.60mm
16-gauge	0.662in	16.83mm

20-gauge	0.615in	16.53mm
24-gauge	0.580in	14.73mm
28-gauge	0.550in	13.97mm
32-gauge	0.526in	13.36mm

Even larger “shotguns” existed in the 19th and 20th centuries for commercial waterfowl hunting. Known as “punt guns” – as they were mounted on posts on punts or flat-bottomed boats – they were custom-built 1.75in to over 2in caliber (44mm to 500mm-plus) swivel guns loaded with shot or scrap metal. Their barrels were 8ft (2.43m) or longer and the overall length could be up to 13ft (3.96m).

Then what is the “410” shotgun?

There are a couple of exceptions to designating shotguns by gauge. The gauge system was not applied to the “four-ten” shotgun popular in the US and Britain, which obtained its name because its bore is .410-caliber. If designated in the gauge system it would be 67.5-gauge. One occasionally sees it described as “410-gauge,” but this is entirely incorrect. The Air Force even marked cans of .410 survival shotgun shells as “cartridges, shotshell, .410 gage,” to incorporate two errors, designating it by gauge and misspelling it as “gage.” It has also mistakenly been called 36-gauge (not even close, that would be 0.506in) and in Europe it is known as the 12mm (it is actually 10.4mm – “4-10” transposed by coincidence). Regardless, these are accepted designations and “36-gauge” and “12mm” are sometimes marked in parentheses on .410 cartons. It has been suggested that “36-gauge” was used simply to fall smoothly in line with the above run of standard shotgun gauges and this may well have been the case. The .410 appeared in Britain in the 1870s and did not become common in the US until about World War I. It is often claimed that the .410 was derived from the .44 Extra Long (.44 XL or EL) introduced by Ballard in 1876 for its single-shot rifles, but was replaced by the .44-40 Winchester. The assumption that the .410 was derived from the .44 XL was because there

was a shotshell variant, but the .410 shotshell had long been in use in Britain and Europe.

… And there were even SMALL SHOTSHELLS

There were also little 9mm (0.355in) rimfire shotguns available in the US in the 1920s and earlier in Europe. These smallest of shotguns were intended for small pests and known as “garden guns.” Today the 9mm shotshell has been “replaced” by the .22 Long Rifle birdshot, aka “ratshot” or “snakeshot.” These tiny shotshells are only good for rats, mice, and snakes within 10ft (3m) or closer. Even then, don’t expect immediate disabling wounds, in fact, they may attack if wounded (just kidding). Except at pointblank range it will not ever penetrate layered bird feathers. It provides a 6in (150mm) shot pattern 6ft (1.82m) from the muzzle. The shot size is officially called “dust” (0.04in – 1.01mm) in diameter. They are also loaded with the next larger shot size, No. 12 (0.05in – 1.03mm).

Do the different COLORS OF SHOTGUN SHELLS have a meaning?

Shotgun shells may be thick paper or plastic with brass heads or all brass or all plastic including the head (introduced in the 1960s). Empty shotgun cartridges are often called “hulls.” Paper and plastic shotgun shells are colored, with red, green, and blue being the most common. In the US most ammunition companies produce red shells, but Remington uses green and Peters blue. UMC used to use green and maroon. There are exceptions among other manufacturers to include foreign shotgun shells. Other colors such as black, light blue, brown, and tan will be encountered. There is one notable exception. From 1960 Federal Cartridge Company began producing 20- gauge shells with yellow cases allowing them to be easily identified if mixed with 12-gauge shells; the two most popular American gauges.

The reason for this is that a 20-gauge shell loaded into a 12-gauge shotgun will catch on the forward lip of the chamber, the chamber being slightly larger in diameter than the bore. When a break-open breech-loading shotgun is opened the chamber appears empty as the shell is 2¾ or 3ins[104]

down the chamber and a 12-gauge shell can inadvertently be loaded atop the 20-gauge. The carnage can well be imagined. Yellow 20-gauge shells though have not been 100 percent standardized throughout the industry, so take appropriate precautions.

Federal 16-gauge shells are purple as they can similarly slip through the chamber of 10-gauge shotguns, although there are fewer opportunities of this occurring as the latter are none too common, although they have re-achieved a degree of popularity in recent years.

Did the US armed forces issue purpose-made HANDGUN SURVIVAL AMMUNITION?

Yes, in fact there were two types of survival ammunition issued in World War II. The US Army Air Forces issued its airmen .45-caliber M1911A1 pistols while the navy and Marines issued .38 Special S&W Victory Model revolvers as well as M1911A1s. Besides standard full metal jacket .45-caliber M1911 and .38 Special M41 ball ammunition, tracer ammunition was issued to aircrewmen. Both the .45-caliber M27 tracer and .38 Special tracer (no model number) were identified by a red bullet tip and produced a red trace. Even though the .45-caliber tracer could be used in submachine guns, it was mainly intended as a "survival" round. It was seldom used in submachine guns. The idea of these handgun tracers was to provide airmen with a "mini flare gun." They could be fired into the air, especially at night, to attract the attention of search aircraft. It was not a good idea to fire in the general direction of the aircraft as it might be assumed it was enemy tracer fire. It was admittedly a poor means of signaling as the red trace was very small and not as attention-grabbing as a much larger and slowly moving (more exposure time) distress flare. However, it was better than nothing. The tracer rounds were just as effective as ball ammunition for personal defense. The origins of .45-caliber tracers were in the mid-1920s when red and green signal rounds were developed for the pistol and submachine gun. The cavalry and Coast Guard used them to signal between patrols, the Coast Guard using them during anti-rumrunner operations.

Additionally, special handgun shotshells were provided to aircrewmen in survival vests and kits. They provided a means to shoot birds and small game at close range (effective range listed as 25ft – 7.6m). These rounds

were the M12 (T23) and M15 (T29) for the .45-caliber M1911A1 pistol and there was a similar, but undesignated, shot cartridge for .38 Special revolvers. The M12 and the .38 Special rounds had vermillion (light reddish orange) pressed paper bullet-shaped capsules housing the shot. The M12 was developed from the police/prison guard .45 Peters-Thompson riot cartridge for the Thompson submachine gun.[105] The paper capsules deteriorated if wet and in the tropics or at sea swelled to prevent their loading. The M15 of 1943 had an extended brass case closed by a yellow or vermillion cardboard wad retaining the shot. These rounds were loaded with No. 9 birdshot (0.09in – 2.29mm), 135 pellets in the .45. It is said that these shotshells were effective against sharks if fired at pointblank range at the nose. It has been found that these loads were too light for effective self-defense against humans other than at a few feet and repeated shots. Some cartons were marked, "Use only for hunting game. Do not use against enemy troops." Similar commercial shotshells are available in many handgun calibers for use against varmints.

What was the LARGEST CALIBER RIFLE?

Using 15mm (.59-caliber) as the defining criteria for a small arm, there are several rifles that fit this definition. However, rifles of this caliber-range are by no means standard rifles; they are antitank, anti-materiel, or long-range sniper rifles. There were some antitank rifles that, while called "rifles," were even of larger caliber, for example the Swedish Solothurn s18-1100, Finnish Lahti L-39, and the Japanese Type 97 (1937). These were heavy 20mm (0.787in) weapons developed before World War II and saw some use in that conflict. They were fired from bipods and had shoulder stocks, but some were provided with optional small two-wheel carriages. That of course does not "redefine" small arms as being up to 20mm just because there were antitank "rifles" of that caliber. Remember, the term "rifle" does not necessarily mean a small arm. "Rifle" can refer to a long-barreled large-caliber cannon. There is an exception within every category of weapon; the Austrian Steyr 15mm AMR-IWS 2000 anti-materiel rifle sits on the borderline of this definition. Few of these massive rifles are in use, it mostly being a concept weapon.

The Soviets made the widest use of antitank rifles in World War II producing some 400,000. They continued their use through the war even when other countries were adopting lighter rocket-propelled and recoilless antitank weapons. Two models were employed; both 14.5x114mm (.58-caliber).[106] Both bipod-mounted rifles were heavy and extraordinarily long, but could be broken down into two sections, the action and shoulder stock, and the barrel. They were still awkward to carry. The **Degtyarov PTRD-41** was single-shot bolt-action, 78.74in (1,999mm) long and weighing 38lb (17.44kg). The **Simonov PTRS-41** was semiautomatic with a five-round magazine. Its 84.25in (2,140mm) length and 46lb (21kg) weight, coupled with its complexity and cost resulted in it seeing much less service. Both were adopted in August 1941 and assigned to rifle regiments. They saw their first use in combat in November 1941 and the numbers assigned to units were increased. Antitank rifles were distributed to many other types of units for self-defense. The 14.5mm (0.586in) armor-piercing-incendiary round could penetrate 20mm of armor at 100 meters. This was the only type of round provided. Soon obsolete, they remained in use with tactics emphasizing side and rear attack, as well as use against the many light AFVs encountered on the battlefield, shooting at buildings, and as sniper rifles, although they were not precisely accurate at long ranges, and even barrage-fired at low-flying aircraft. The PTRD-41 was used by the North Koreans during the Korean War. The 14.5mm cartridge was used in the post-war KPZ heavy antiaircraft machine guns (ZPU-1, ZPU-2, and ZPU-4 [number indicates the number of barrels on wheeled carriages]).

The South Africans introduced the **Mechem NTW-14.5** anti-materiel rifle in 1993 chambered for the Russian 14.5mm. It was previously produced in 20mm and is bolt-action with a three-round magazine. Overall length is 70.66in (1,800mm) and it weighs 61.7lb (27.98kg). It has seen little use outside of South Africa. Another little known 14.5mm anti-materiel rifle is the Cuban-made semiautomatic **Mambi-1** made by *Union de la Industria Militar.* The bullpup design uses a massive muzzle break, five-round magazine, bipod, and was heavily influenced by the US Barrett M82A2.

The modern anti-materiel rifle is an outgrowth of the World War II antitank rifle. They are intended for extremely long-range antipersonnel sniping and employed against light armored vehicles, soft-skin vehicles, and high payoff, vulnerable targets such as radar antennas, power

generators, missile systems, parked aircraft, etc. They have also been used to detonate exposed land mines and improvised explosive devices (IED) during de-mining operations. While beyond the 15mm caliber standard, the Barrett 25x59mm **XM109** anti-materiel rifle fed by a five-round magazine is under development by the US Army for special purpose use.[107] Its high-explosive dual-purpose round can penetrate up to 40mm (1.5in) of armor at 500 meters. Its main role though is for de-mining operations and its range is relatively short compared to other anti-materiel rifles. Non-lethal crowd control rounds are also under development for the XM109 to make this limited use rifle more variable. It is much shorter than similar rifles with only a 17.6in (447mm) barrel and weighs 33.2lb (15kg).

There were earlier, larger caliber "rifles" being used in China in the 1880s, although they exceeded 15mm caliber. The **.75-caliber Jingal** (aka "gingall") rifle was a native-made scaled up single-shot, bolt-action rifle some 6ft long. It was operated by a two-man crew with one assisting in carrying it and serving as a "bipod" when necessary. It was designed as a "rampart gun" and intended to be fired from walls on swivel mounts; although they were sometimes mounted on tripods. The lead round-nose .75 Jingal bullet was actually .767-caliber (19.4mm) and had a 2.86in (72.6mm) long straight rimmed cartridge case. They were also made in .60-caliber (15.2mm). Even earlier Jingals were match-lock, muzzle-loading, smoothbore weapons and had also been used as swivel guns aboard pirate junks. Jingal rifles might be said to be the period's "anti-materiel rifles."

Recently a video clip has been circulating showing a rifle called the "577 T-rex" being fired by unsuspecting individuals with the rifle generating such recoil that they are often knocked off their feet or the rifle ripped from their hands. This is actually a .577 Tyrannosaur cartridge fired in an A-Square Hannibal Model rifle listed as costing US$4,000. This 13.2lb (6kg) single-shot, bolt-action rifle is intended as a last resort animal-stopper to drop a large enraged charging beast. It uses a modified M1917 Enfield rifle action, one of the strongest readily available standard rifle actions. The 3.71in (94mm) long bottlenecked cartridge was introduced by A-Square, a custom specialty firearms company, in 1993 and fires a solid 750-grain bullet at 2,460ft/sec with 10,180 foot pounds of muzzle energy. The .30-06 150-grain bullet achieves 2,740ft/sec with 2,500 foot pounds and the .50-caliber machine gun with a 720-grain bullet reaches 2,810ft/sec and generates 12,630 foot pounds. Regardless of the thick recoil pad and six

mercury recoil reducers inside the stock, it can dislocate a shoulder. Basically it can be said to be intended to knock both the elephant and the shooter on their butts. They are also made in other calibers, but the .577 (14.6mm) is the largest. Its actual caliber is .585 (14.9mm). This appears to be the largest caliber, modern, non-anti-materiel rifle currently available; although it is reported the rifles and ammunition are no longer in production.

There was actually a still larger caliber "rifle," although this could be considered more of a novelty piece and exceeds the 15mm rule. This was the **.950 JDJ** (24mm) developed by J. D. Jones in 1996. The comparatively short cartridge case was that of a cut-down and resized 20x102mm round used in M61 Vulcan rotary aircraft cannons. The McMillian single-shot rifle made by SSK Industries weighed just over 100lb – give it mud wheels and a team of horses and you have light artillery. The .950 JDJ fired a 3,600-grain round-nosed bullet at 2,200ft/sec. Only three were made.

Just what is an ELEPHANT GUN?

In the "sporting" arena the largest caliber rifles fell into a category broadly known as "elephant guns." In the late 1800s, 10-, 8-, 6-, and 4-gauge muzzle-loading, double-barrel shotguns were used with solid lead slugs (full-bore balls) backed by black powder to knock down big game such as elephants, rhinoceros, hippopotami, cape buffalos … and meerkats. They were hunted for their ivory or to mount as trophies or shot in defense when enraged beasts charged hunting parties. A 4-gauge slug weighed ¼lb (113.4g). Between the 1880s and the turn of the century, rifled, double-barrel, break-open and single-barrel, bolt-action elephant rifles appeared in .45-caliber and larger big-bore cartridges. There were some smaller calibers, as small as .375-caliber.

The largest and latest of these is the .700 Nitro Express (17.8mm) usually chambered in Holland & Holland double-barrel rifles. It throws a 1,000-grain (65g) full metal jacket bullet. It was developed in 1988 and is a scaled up .600 Nitro Express (15.24mm) introduced in 1903. It is often marketed as the most powerful commercial rifle available, but this claim actually goes to the .585 Nyati (14.9mm) (*Nyati* = cape buffalo in Swahili) firing a

750-grain (49g) bullet with a muzzle energy of 10,130 foot pounds at 2,466ft/sec (752m/sec).

The advent of modern smokeless powder and higher velocity bullet designs from the 1890s saw a vast improvement in elephant rifle designs. The cartridges were usually topped by solid full-jacketed bullets rather than hollow- or soft-points. This was because what actually killed or disabled such large animals with thick hides, dense muscle mass, and robust bone structure was penetration, not necessarily shock and tissue damage. The bullet had to punch through massive skulls and shoulder bones and penetrate deeply to damage vital organs. Such rifles were often carried by gun bearers in parties hunting smaller game for protection from chance encounters with large beasts.

Among the most popular cartridges were the British .450, .470, and .600 Nitro Express made by Holland & Holland. The "Express" loads were named after "express" trains, that is, non-stop high-speed trains, and used in the same context as "magnum" cartridges – high propellant capacity, high-powered. Others included the .375 H&H Magnum, .404 Jeffery, .416 Rigby, .416 Weatherby Magnum, .500 Jeffery, and .505 Gibbs. The first American-produced big game-takedown cartridge was the .458 Winchester Magnum, but it was not introduced until 1956. The use of elephant rifles dwindled from the 1970s as actual big game hunting safaris fell out of favor, but they are still in demand and being produced.

The larger Nitro rounds could actually break a collarbone or shoulder … of the shooter if not shouldered properly. In the gun world there is what is termed a "recoil index" to give prospective buyers an idea of what a rifle's kick is like. A .30-06 is rated as 1.0, which for many people is about the limit of what they can comfortably shoot multiple rounds. A .243 Remington is rated at 0.4, a .270 Winchester is 0.8. The .600 Nitro Express is rated at 9.4 … 9.4 times more punishing recoil force than a .30-06 in a bolt-action rifle, which generates more recoil than a semiautomatic rifle with its recoiling bolt and operating rod absorbing much of the recoil.

During World War I both the British and Germans used small numbers of elephant rifles to suppress and neutralize snipers using steel plate shields on the Western Front. Some British officers had their personal elephant rifles and a supply of ammunition shipped to France for this purpose. These were relatively effective as they were accurate, intended for long-range shooting, and had full-jacketed bullets for better penetration. The term "elephant

rifle" was also colloquially used when referring to some antitank rifles during World War II.

FACT:
"Magnum" cartridges referred to large cartridges containing additional propellant and the name was derived from the French term for the next larger wine bottle than a standard "bottle" (½ liter – 25oz), a "Magnum" was twice as much, a full liter (50oz).

What was the LARGEST CALIBER handgun?

As Clint Eastwood's Harry Callahan character said in *Dirty Harry* (1971), "But being as this is a .44 Magnum, the most powerful handgun in the world, and would blow your head clean off, you've got to ask yourself one question: Do I feel lucky? Well, do ya, punk?"

That can no longer be said, nor was it completely accurate at the time. In the early 1960s R. G. Wilson of Fulton, Michigan built reproductions of the Colt Single Action Army revolver, the Peacemaker. While .45-caliber was the original, there were a couple of differences. The **Wilson Peacemaker** was approximately one-third larger overall than the original, weighed 6.5lb unloaded, and it was chambered for the massive 2.70in long .45-70 Springfield intended for trapdoor rifles.

While the **.44 S&W Magnum**, introduced in 1955 for the firm's Model 29 large-frame revolver, long reigned as the most powerful handgun, other large-caliber handguns have since appeared, such as the **Ruger Blackhawk** and **Colt Anaconda**, and .44 Magnum carbines were also produced. It may come as a surprise to some that the **.44 Magnum** and **.44 Auto Mag** are actually .429-caliber. The gas-operated **Desert Eagle** pistol, available in several marks, was developed by a US firm, Magnum Research, Inc., and produced mainly by Israeli Military Industries as a commercial venture. They were made in several calibers, the largest being .44 Magnum and .50 Action Express (.50 AE). The .50 AE with a 300-grain jacketed hollow-point bullet achieves a muzzle velocity of 1,579ft/sec and muzzle energy of 1,568 foot pounds. The .44 Magnum with a 250-grain of the same type of bullet has a 1,180ft/sec muzzle velocity and a 775-foot pound muzzle

energy. The .44 Auto Mag appeared in 1971 for the Auto Mag semiautomatic pistol made by High Standard. It was essentially a .30-06 or .308 Winchester (7.62mm NATO) cartridge cut down to 1.30in (33mm) and then reamed inside to accept the .429-caliber bullet. It was slightly more powerful than the .44 Magnum. There were a lot of problems experienced with this hunting pistol and its life was short, other than movie appearances. There was also a little used **.45 Winchester Magnum** (.451-caliber) introduced in 1979 for the Wildly semiautomatic pistol and also used in the single-shot Thompson/Center Contender pistol.[108] This was simply a much lengthened .45 ACP.

Magnum Research, Inc. offers a line of five-shot revolvers called the BFR (Biggest Finest Revolver) in such calibers as .444 Marlin, .45 Colt/.410 shotshell, .450 Marlin, .454 Casull, .45-70 Springfield, .480 Ruger/.475 Linebaugh, .500 S&W, .50 AE, and .460 S&W Magnum. A more recent addition is the **Taurus Judge .45/410 revolver**, a comparatively short-barreled five-shooter, the cylinder is as long as the barrel, capable of firing the .45 Colt *and* .410 2½in shotshell. In 2011 Taurus introduced the **Raging Judge revolver** in 28-gauge (.550in – 13.97mm).

What must be the largest handgun, strictly a novelty piece, is the massive **Pfeifer-Zeliska revolver** chambering .600 Nitro Express elephant gun cartridges (15.2mm, introduced in 1903) and made by Zeliska Firearms. It costs US$16,000 and the rounds US$40. The Austrian-made five-shot revolver weighs 13.23lb (6.001kg) and is 21.65in (55cm) long. It is also made in .458 Winchester Magnum.

Even though six-shot revolvers had been in use by the US Army and Navy since before the Civil War, the navy adopted the .50 Remington M1865 and M1867 and the army the M1871 single-shot pistols, definitely a step backward. These used breech-loading, rolling block actions; apparently attempting to be a real man-stopper. The metallic centerfire cartridges with internal primers used in the two pistols were of slightly different designs and while navy cartridges could be fired in army pistols, the reverse was not possible. They were soon replaced by revolvers as a multi-shot revolver was more deadly than hoping for the best with a single shot.

In muzzle-loading, cap-and-ball pistol days there were many larger caliber handguns ranging from .50 to .85-caliber (12.7mm to 21mm). One of the most devastating types of pistols was known as a “howdah” – after

the seat platform on which persons rode on the back of elephants in India. Hunters occasionally suffered the terrifying experience of a wounded and vengeful tiger climbing up the side of a no doubt alarmed elephant to attack its assailants in the howdah. As a last resort, close-range defense "howdah pistols" were used, which also proved effective against equally irrational humans in confrontations afoot. These were double-barrel pistols typically with 10–12in rifled barrels and were commonly British and Belgian-made. They had a pistol grip and short forearm for a very necessary two-handed hold. Dating from the early 1800's, they fired solid slugs and were commonly found with bores of .57, .66, and .70-caliber. Early howdahs were muzzle-loading, but later shotgun-type break-open breech-loaders used pin-fire or centerfire metallic cartridges.

What were the SMALLEST CALIBER firearms?

These obviously are not military weapons, but are covered here owing to their uniqueness. They are purely novelty pieces with little practical use other than indoor target practice or perhaps hunting mice and cockroaches. They were intended too as ladies' defensive weapons, but this was more of a trendy fad than a practical weapon.

The smallest commercially made centerfire cartridge ever was the 2.7mm Kolibri (.106-caliber). There was also a 3mm Kolibri (.118-caliber) cartridge when something "heavier" was necessary. These rounds were fired in the **German Franz Pfannl *Kolibri*** (Hummingbird) made circa 1913 as a lady's handbag pistol; the smallest caliber semiautomatic pistols ever made. Of course it's questionable how much protection these pistols provided, but if aimed at the face it might smart.

In the 1920s and 1930s two 4mm *Übungsmunition* (.157-caliber) practice ammunition cartridges were produced in Germany, Spain, and other countries. They were used with barrel inserts fitted into many popular pistol models for indoor target practice. The original 4mm Mod. 20 was developed by Gustav Genschow and Company (Geco). It was a rimmed cartridge. A 4mm rimless version was made by RWS from 1921. Neither round contained propellant being propelled only by the primer, which actually doubled as the case.

The "largest" of this class of cartridge was the 4.25mm Liliput (.167-caliber) used in the German ***Liliput*** **semiautomatic pistol** made from 1920 to 1927. Another 4.25mm pistol was the **Franz Pfannl** ***Erika***. These too were lady's handbag pistols.

There were two 5mm (.196-caliber) rounds, the Clement and the Bergmann, developed for the Spanish **Charola-Anitua** and **Belgian Clement** automatic pistols, and the German **Bergmann No. 2** in the 1890s. The Bergmann fell from use in the 1900s and the Clement hung on until 1938. These rounds were for all practical purposes replaced by the popular and decidedly more potent 6.35mm Browning (.25 ACP) for small, easily concealed pistols after being introduced in 1906.

The smallest rimfire cartridge is the 2.34mm SwissMiniGun (.092-caliber, about the diameter of a pinhead) used in the **SwissMiniGun Nr. C1ST revolver**, a miniature replica of a Colt Python. The cartridges and revolver are certified in the *Guinness Book of World Records* as the smallest functional handgun ever. The revolver is 2.2in (55mm) long overall, definitely a novelty piece; something to hang on one's keychain.

In early 2008 the FBI finally announced the existence of the SwissMiniGun stating that it has the potential of being used by terrorists in the same manner as a box cutter. It had been "discovered" on the manufacturer's website and reported to the FBI by a police detective in 2006. This was duly reported to a less than shocked public by a concerned news media *two* years later.

It is illegal to import the SwissMiniGun into the US as it is under the legal 3in (76mm) minimum *overall* length for a handgun. Fears that it could be used by terrorists have been expressed by the FBI, which claims it could be lethal if it hit a person in the right place; perhaps in the left ventricle during open-heart surgery. The bullet weighs 1.9753 grains (0.128g) with a muzzle velocity of 399.6ft/sec (121.8m/sec) developing a muzzle energy of 0.7154 foot pounds (0.97 Joule). The "warning" said the bullet had a speed of "300 miles per hours" (its actual speed is 272mph) to make it sound more "impressive," but bullet velocity is not normally expressed in "miles per hour." This is only 400ft/sec and the FBI warning provided nothing to compare the "300mph" to in order to allow facts to be considered in a realistic perspective. Typical BB air rifles have 10 times more power than the 2.34mm SwissMiniGun. A .117-caliber (4.6mm) BB weighs 5–6 grains. For further comparison, a .22 Short with a 29-grain (1.88g) bullet develops

1,045ft/sec (319m/sec, or 712mph) impacting with 95 Joules, somewhat higher than 0.97.

The SwissMiniGun is classified as a non-gun in some countries because it is so underpowered. By the way, the "cheap" models are gold- or silver-plated, but lacking the encrusted jewels of the premier models (going for up to US$47,000), and cost about US$6,000, plus there is a six-month waiting period. Not exactly something a terrorist would be interested in, especially since an aptly wielded pointy No. 2 pencil is much more lethal. As "Dirty Harry" might say, "Did he fire six shots or only five? Well, to tell you the truth, in all this excitement I kind of lost track myself. But being as this is a 2.34mm SwissMiniGun, the most underpowered handgun in the world, and might sever an eyelash, you've got to ask yourself a question: 'Do I feel lucky?' Well, do ya, punk?"

Until 2001 the smallest *standard* military cartridge seeing combat was the Soviet/Russian 5.45x39mm (.220-caliber, actually 5.6mm) used in AK-74 and AKS-74 assault rifles, RPKS-74 light machine gun, and AKS-74U "Krinkov" submachine guns adopted in 1974 as well as the later AK-100-series weapons. (Colonel Kalashnikov, the AK's designer, initially opposed such a small caliber and wanted to improve the 7.62mm.) Previously this smallest caliber "distinction" was held by the US 5.56x45mm (.223-caliber) round used since 1962 in M16-series rifles and other weapons. It was made the standard NATO round in October 1980 (STANAG 4172). Prior to the 5.56mm the smallest standard military cartridge was the 6mm Lee (.236-caliber; 6x60mm) used in the US Navy's Lee M1895 rifle and the Colt Mk 1 Mod 0 machine gun. There have been several experimental military super small-caliber rounds, as small as 4.32mm (.17-caliber) and of unconventional design, but these were test sabot cartridges and never standardized. Britain had entered a 4.85x49mm (.197-caliber) round in the mid-1970s in the NATO competition, but the US 5.56mm was adopted.

The most recent addition to the smallest standardized cartridge in military service is the 4.6x30mm to replace the Uzi 9mm MP2 machine pistol in German service. The MP7 was designed to compete with the Belgian FN 5.7x28mm and its P80 personal defense weapon and Five-seveN pistol introduced in 1994. The 4.6x30mm is .177-caliber and throws a 24.7-grain bullet while the 5.7x58mm is .224-caliber with a 55-grain bullet. Both of these cartridges were designed specifically to penetrate modern Kevlar® body armor.

In the sporting arena there were two very small bore cartridges available for varmint hunting. Most popular varmint cartridges are in the .22-caliber-range or even larger. The .17 Remington (4.36mm) was introduced in 1971 for the Remington 700-series bolt-action rifles. Some other manufacturers offered rifles in this now little used cartridge. It was based on a necked down .223 Remington case (5.56mm NATO). The other was the 5mm Remington Rimfire Magnum (.205-caliber). This was a bottle-necked rimfire cartridge introduced in 1970 in a new line of repeating rifles. Intended to compete with the straight-cased .22 Winchester Magnum Rimfire, it never quite caught on and is seldom seen now.

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[100] Verdigris can be cleaned from cartridges first scrubbing it off with a soft toothbrush and then applying a small amount of lemon juice or vinegar with a cotton swab or toothpick for 15-20 minutes.

[101] Smokeless powder, *Poudre B,* was invented by a French chemist, Paul-Marie-Eugène Vieille (1854–1934), in 1884. It was made by dissolving nitrocellulose in ether and alcohol until it became a gelatinous mass, which was rolled into sheets and cut into flakes after the solvent evaporated. The first military cartridge using smokeless powder was the French 8x50mmR Lebel of 1886. Much improved nitrocellulose single-base propellants were later developed by Alfred B. Nobel (1833–96), who also patented dynamite in 1867 and established the Nobel Prize. Other smokeless propellants were also developed such as cordite and ballistite. The oft used description "the smell of burnt cordite," is only accurate if referring the Commonwealth weapons from World War II and earlier.

[102] Originally called the .38-40 and .44-40 Winchester, they were loaded with black powder. When they began to be loaded with smokeless powder they became known as the .38 WCF and .44 WCF (Winchester Center Fire), but are still more commonly known by their original designations. In Spanish-speaking countries the .44-40 is known as the .44 Largo (Long) and the caliber is marked on some old revolvers as .44 W (Winchester).

[103] The .577-450 Martini-Henry cartridge was actually .458-caliber being a necked down verion of the older .577in Snider.

[104] The 12-gauge 2¾in (70mm) long shell is standard in the US. The 3in (76mm) is a magnum load and it should never be attempted to load them into a 2¾in chamber. Most modern 12-gauge shotguns have 3in chambers. There is also a little used 3½in (90mm) long-range round, introduced in 1987, requiring special shotguns. The 12-gauge 2½in (64mm) was standard in Europe. The shorter rounds may be fired in longer chambered shotguns, but there may be feed problems in semiautomatic and pump shotguns.

[105] The Peters-Thompson riot cartridge had a longer capsule and could not be loaded in standard Thompson SMG or pistol magazines. A special 18-round magazine was necessary for use with the Tommy gun. The round contained 150 No. 8 birdshot pellets and was only effective at a very short range.

[106] Not to be confused with the British-designed straight-cased 14.5mm trainer-spotter M181/M182/M183 (different ranges) cartridges used in the US M31 artillery subcaliber trainer. Overall cartridge length with projectile is 65mm.

[107] The 25x59mm round was developed for the XM307 Advanced Crew Served Weapon (ACSW), the planned replacement for the .50-caliber M2 machine gun and 40mm Mk 19 automatic grenade

launcher. The ACSW project was canceled in 2007.

[108] The Thompson Contender, dating from the 1960s, is a single-shot, break-open target and hunting pistol made in a couple of dozen different calibers ranging from .22 Long Rifle to .410 shotshell and even rifle rounds such as the .270 and .308 Winchester. The barrel could be easily removed and replaced by any desired caliber barrel with different lengths available.

4.
AMMUNITION MYTHS

Myths in regards to ammunition, like those involving weapons themselves, were created by simple misunderstandings, assumptions, or efforts to explain the inexplicable. Some can indeed lead to dangerous situations or prevent a weapon from being employed to its maximum advantage, and here the author attempts to set the record straight.

A comment on WEAPON CALIBERS

Regardless of the country, the designation system used, the official designated caliber of a weapon, be it a small arm or large-caliber crew-served piece, more often than not the caliber shown is different than the actual caliber. One should have ascertained this through reading this book to this point. There might be but a fraction of an inch or millimeter difference or there might be a significant difference.

REMEMBER:

- **Never assume the designated caliber is the actual true caliber.**
- **Never assume that two weapons from even the same country designated by the same caliber have interchangeable ammunition** (the US .30-caliber M1 rifle and the .30-caliber M1 carbine, for example). There are many examples where they are not interchangeable (Russia/USSR has used four entirely different 7.62mm rounds).

Ammunition/weapon caliber designations are just that, designations, and there are many reasons for them not reflecting the weapon's true caliber. Cartridge caliber designations are often rounded off, otherwise simplified, or so designated to differentiate them from cartridges of similar caliber. Of course many cartridges are designated by the same caliber, but it should never be assumed they are interchangeable; more often they aren't – the .303 British and .303 Savage are not interchangeable, for example. The issue is further confused as there are often multiple alternate designations for a given cartridge with some rounds having up to six common and often very different names.

The same can be said for ammunition color coding used to identify special purpose military bullet types. One should never assume that color coding and other markings have the same meanings from one country to another or from one era to another for the same country. This applies to small arms ammunition bullet tip colors and large-caliber ammunition projectile colors and markings. While special purpose ammunition is commonly identified today by painted bullet tips, in the past other means were sometimes used. These included painted bands around the bullet, neck mouth or case and the primer pocket; or large portions of the case painted or stained by chemical treatment. A colored paint band is often seen around the case mouth and primer pocket on military cartridges, but this is usually simply weather sealing, but may also identify the bullet type or some other feature. Different countries use different identification systems, which have changed over time, and there are always exceptions plus special purpose and experimental ammunition bearing different codes with diverse meanings. In recent years, NATO standardized codes have been adopted by many non-NATO countries, but it by no means has been accepted worldwide. The old Warsaw Pact system will still be found in wide use throughout the world.

Is it true that US/NATO and Russian/Soviet/Warsaw Pact ammunition are INTERCHANGEABLE?

To make a long story short – **it's not, none of it**, regardless of what you may have been told. A lot of military people, including Intelligence types, have been teaching this for years and should know better. Of the five

different 7.62mm cartridges used by the former Warsaw Pact and many other communist client countries around the world to include China and North Korea, none are interchangeable with the NATO 7.62x51mm round. Warsaw Pact 7.62mm rounds included the 7.62x25mm (pistols and submachine guns),[109] 7.62x38mmR (Nagant revolver), 7.62x39mm (SKS carbine, AK-type assault rifles and light machine guns), 7.62x45mm (Czechoslovak rifles and light machine guns), and 7.62x54mmR (rifles and machine guns). *None* of these can be fired in 7.62mm NATO weapons or vice versa. These rounds have completely different dimensioned and shaped cases (length, head, body, shoulder angle, extractor groove or rim) from the 7.62mm NATO, plus their bullets are .311-caliber. The 7.62mm NATO bullet is .308-caliber. US military contracted 7.62x39mm were provided to friendly nations, and it is even marked: DANGER – PROHIBITED FROM USE IN 7.62MM M14 RIFLE · M60 · M73 · M134 MG.

Other Communist Bloc ammunition interchangeability rumors persist. The US/NATO 5.56x45mm and Russian 5.45x39mm rounds for AK-74 assault rifles and RPK-74 machine guns are not interchangeable. The US .50-caliber (12.7x99mm) is not interchangeable with the Russian 12.7x107mm round (see below) and the 9x19mm NATO (9mm Parabellum) is not interchangeable with the Russian 9x18mm Makarov.[110] The 40mm NATO grenade cartridges are not interchangeable with the Russian 40mm grenade being of an entirely different caseless design.

Another Soviet weapon reputed to be capable of firing US ammunition – but the Soviet ammunition could not be fired in the US weapon – was the 107mm B-11 recoilless gun from the 1950s. It could *not* fire US 106mm M40-series recoilless rifle ammunition. The B-11 was smoothbore and the M40A1 rifled. The projectiles and cartridge cases were of entirely different designs, diameter, and length; the B-11's being much longer than the M40A1's. The 107mm case had a blowout base while the 106mm had the sides of the case perforated for combustion release. (As an aside, the 106mm M40-series was actually 105mm.) There is also the matter of timing; the 107mm was fielded in 1954 and the 106mm in 1958. It would have been rather difficult for the Soviets to have designed a weapon capable of firing as yet to be fielded US ammunition.

Are Soviet/Russian 12.7mm and US .50-caliber machine gun ammunition interchangeable?

The US .50-caliber is *not* interchangeable with the Soviet/Russian 12.7x107mm round (also sometimes designated 12.7x108mm; actual case length is 105.95mm), even if the latter is commonly called a ".51-caliber." This oft claimed interchangeability is an assumption made from the 12.7mm being listed as ".511-caliber" in US intelligence publications during the Vietnam War.[111] Actually, both weapons are .511-caliber, but that does not make the rounds interchangeable one way or the other (true bullet diameter .50-caliber is 12.98mm, 12.7mm is 12.95mm). The cartridge case dimensions and shape prevent chambering these rounds in the other's weapon. The .50-caliber's 99mm long case with a 20.42mm rim diameter cannot be fired in the 12.7mm's 106mm long chamber with a 21.60mm rim. The .50-caliber round can be individually hand-fitted into the 12.7mm chamber, but it will not automatically feed from belts and will jam when attempting to extract the first round. If it did fire the case would rupture and fail to extract as well as damage the weapon. Additionally, the two guns' metallic-link belts are of entirely different design and are not interchangeable; they will not work in the other weapon and rounds of one type cannot be properly seated in the other's links. The US gun uses a disintegrating link belt and the Russian a non-disintegrating belt.

A large number of countries use the .50-caliber machine gun and many manufacture its ammunition, most to NATO standards (NATO STANAG 4383). This ammunition, called the 12.7x99mm in Europe and previously 0.5in in the UK (now called 12.7mm there as well), may be used in US weapons. Countries manufacturing, or which have manufactured, .50-caliber ammunition include: Argentina, Australia, Belgium, Bosnia and Herzegovina, Britain, Canada, China, Dominican Republic, Egypt, Finland, France, Germany, Greece, India, Iran, Iraq, Israel, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Pakistan, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Syria, Turkey, United States, and Yugoslavia.

The Australian F1 ball is the same as the US M33 ball, for example. It is common for many of these countries to sell .50-caliber ammunition to others using the Browning M2 and M3 machine guns. The weapon is so

good that there are virtually no other machine guns in this caliber; there's no sense in attempting to compete. While a few types of special purpose rounds may be encountered that have no US equivalents, most are of the standard US types and generally use the same color codes.

By the way, the .50-caliber M8C spotting rifle mounted on the 106mm M40-series recoilless rifles used an entirely different cartridge than the Browning machine gun's. It used a shorter 76mm (3in) long case. The M48 and M48A1 spotter-tracer round (red tip, yellow band – different primers) had a white phosphorus marking charge with an exposed stab detonator in the bullet tip and left a red trace (later M48A2 rounds did not require a dangerous tip detonator). *Caution:* If dropped from 3ft or higher the M48 and M48A1 may detonate.

There was even a larger .50-caliber cartridge. The British developed the Vickers Class D machine gun in the mid-1920s. It was never adopted by Britain, but some were purchased by China, Japan, and Siam (Thailand). It fired a 0.5in round known as the V/664 or V/690 (depending on bullet weight). This was a 12.7x120mmSR round, 13mm longer than the Soviet/Russian 12.7x107mm and 21mm longer than the US .50-caliber. The Royal Navy made wide use of a smaller 0.5in V/580 round in the Vickers Mk III quad machine gun, the 12.7x81mm. There was also a single-barrel tank machine gun. Japan and Italy used a semi-rimmed version of this round in aircraft machine guns, the 12.7x81mmSR.

Interchangeability of 81mm and 82mm MORTAR AMMUNITION

It has long been accepted that the Russians can fire US/NATO 81mm rounds in their 82mm mortars, but that US forces cannot fire Russian 82mm rounds in their mortars. The Soviets picked that caliber for that purpose as many countries were using the Stokes-Brandt 81mm mortar. In World War II the Germans used an 81mm mortar, which they designated the 8cm. The Germans captured a lot of Soviet 82mm mortars and fired their own 81mm ammunition in them. While US/NATO 81mm ammunition can be fired in Soviet/Russian/Chinese 82mm mortars no more than charge 5 (M362, M364, M365-series rounds for the M29A1 mortar) and charge 3 (M821, M819, M889 rounds for the M252 mortar) should be used. US firing tables

may be used, but there will be very slight range variations and the rounds should not be fired over or too close to friendly troops.

That said, in actuality Russian/Chinese/North Korean 82mm rounds *can* be fired in US 81mm M29A1 and M252 mortars, *if* the bore is well worn. The actual caliber of Russian/Chinese 82mm mortar rounds varies from 81.52mm to 81.79mm. The actual bore caliber of brand new US 81mm M29A1 and M252 mortars is 81.9648 (3.227in) and is even "larger" after much use through bore wear. The author has fired Chinese 82mm Type 53 rounds from a US 81mm M29E1 mortar. Prior to attempting this a 82mm round with the ignition cartridge and propellant charges removed should first be dropped into the tube to ensure it freely travels to the bottom of the tube and does not stick. The round is removed in the same manner as a misfired round.

A related myth is that Chinese-made 60mm mortars were actually 61mm and are often seen so designated in Vietnam-era and later intelligence publications and memoirs. The US 60mm mortar round is interchangeable with the Chinese 60mm Type 31 and Type 63 mortar rounds, which are marked "60MM." The Chinese round was/is not 61mm. The Type 31 (1941) mortar was a copy of the old US 60mm M2 and the Type 63 is an undated version. Reporting it as a "61mm" was based on an assumption that they could fire American ammunition, but US forces could not fire theirs in the same manner as the 81/82mm. Both US and Chinese 60mm rounds are actually 60.5mm (2.381in) and it appears someone rounded 60.5mm up to 61mm in intelligence publications. US troops and intelligence analysts in Vietnam commonly, but incorrectly, called Chinese mortars "61mm."

In the US military, is it illegal to use .50-caliber machine guns AGAINST PERSONNEL?

There is an old myth that just will not go away claiming that it is illegal to use antiaircraft weapons against troops, especially for some reason, the .50-caliber machine gun.[112] There is no regulation in the US Army or Marine Corps that says this is illegal. In fact every US manual on air defense guns, including FM 23-65, *Browning Machine Gun, Caliber .50, HB, M2,* dated June 19, 1991, and earlier editions has/had a section on engaging ground targets. There is absolutely nothing in the Hague Convention of 1907 even

remotely suggesting that it is forbidden. The .50-caliber and similar weapons did not even exist then. Even the use of the turn of the century large-caliber anti-balloon machine guns with incendiary bullets (in wide use when the Convention was drafted) were not prohibited from being fired against troops.

Some officers have stated that .50-calibers cannot be used to engage troops, but it is okay to fire on their web gear and individual weapons, i.e., destroying their equipment, which is a sophomoric if not a ludicrous claim. That myth is still related by instructors. The author has researched this subject checking with different JAG officers, appropriate regulations, laws of land warfare, etc., and nothing states that it is illegal to use the .50-caliber against enemy troops. United States armed forces have routinely used the .50-caliber against personnel in every conflict from World War II to the present including Korea, Vietnam, as well as the ongoing conflicts. If this is not convincing, then consult TM 43-0001-27, *Army Ammunition Data Sheets, Small Caliber Ammunition,* April 29, 1994, which states: "Use: Machine Guns, Caliber .50, M2 and M85. The cartridge is intended for use against personnel or unarmored targets."

It would never make sense that the US could and would use flamethrowers, WP projectiles, incendiary rockets, napalm, 25mm chain guns, 155mm howitzers, flechettes, buckshot, and sawtooth bayonets on the enemies of democracy, but we couldn't shoot the enemy with a full-jacketed machine gun bullet originally intended as a light antitank weapon when developed at the end of World War I.

The source of this myth appears to have originated during World War II. In the closing days of the war in Germany, infantry units often had halftrack-mounted twin or quad .50-caliber machine guns attached to them from the antiaircraft artillery automatic weapons battalion supporting the division. They were routinely used against ground targets to include enemy troops and have proven very effective in placing suppressive fire on villages and wood lines prior to advancing. The twin- and quad-fifties were expending ammunition and burning out barrels at a high rate in this role. At some staff echelon it was pointed out that if the Germans were able to mount local air attacks against US forces they might run out of .50-caliber ammunition having expended it on ground targets. This was a valid concern even though, at the time, the Luftwaffe had appeared to have developed "invisible" aircraft. It is said that in some units officers apparently looking

for a way to justify the ammunition conservation order to experienced combat troops took the easy way out and lied, merely saying it was illegal to use antiaircraft weapons or .50-caliber machine guns against personnel.

The .50-cal in use

The use of twin- and quad-fifties in the support role was invaluable and commonplace; a few bursts at the source of small arms fire quickly eliminated the trouble. One .50-caliber battery commander reported that the German machine guns had ceased fire due to stoppages … of manpower. In February 1943 a small 1st Cavalry Division force, serving dismounted as infantry, landed on Los Negros Island in the Admiralties. Digging in around the shore-side airfield, the Japanese were forced to attack a well prepared defensive position. A .50-caliber antiaircraft machine gun battery set up their M2 water-cooled machine guns on the perimeter to contribute their firepower and mowed down fanatical Japanese charges for two nights.

The .50-caliber M2 and M3P machine guns and their many variants are extremely potent against ground troops due to their 2,000yd (1,800m) maximum effective range (1,650yd/1,500m for point targets) and their ability to penetrate earth berms, cinder blocks, sandbags, logs, lightly armored and soft-skinned vehicles, dense underbrush, light concrete walls, masonry, plank fences, etc. US forces should have no reservations employing the .50-caliber or similar automatic weapons against enemy personnel.

The antigun movement is attempting to get the .50-caliber sniper and competitive shooting rifles banned from being in the hands of civilians, declaring them to be a threat.[113] In fact, California enacted the .50 Caliber BMG Regulation Act of 2004 in effect prohibiting such weapons in the state.[114] In anticipation of this eventuality and on request from the Navy, the Barrett Firearms Company, pioneer in the development of .50-caliber sniper and anti-materiel rifles, developed the .416 Barrett (10.6x83mm) in 2005. It uses a shortened and necked-down .50-caliber case. It was also designed as a higher velocity, flatter shooting round than the .50-caliber. Another

cartridge developed for the same role is the .408 Cheyenne Tactical (Chey Tac) (10.4x77mm). It uses a modified .400 Taylor Magnum, itself based on the .505 Gibbs, an old elephant hunting cartridge.

What does the “06” in .30-06 mean?

It means 1906; the year the cartridge was adopted by the US Army. However, if the first rifle chambered for the .30-06 cartridge was the M1903 Springfield, how then can a rifle developed in 1903 fire a cartridge developed in 1905/06? Seldom does anyone seem to notice this little discrepancy even though M1903 Springfield and .30-06, or “thirty-ought-six,” “thirty-oh-six,” or simply “nought-six”, are familar words.

The M1903 rifle was in fact standardized in 1903 and issued for troop trials in 1904; development had begun in 1901. It was originally chambered for a slightly different cartridge, the .30-caliber M1903, generally called the .30-03 among civilian shooters. There was an even earlier developmental “.30-01” with a thicker rim. The .30-03 had a 220-grain round-nose bullet. The case neck was 0.07in (2mm) longer than the future .30-06 cartridge’s to support the comparatively heavy bullet, however, several problems arose with the rifle’s initial version. It was different from the later standard version having a forearm extending almost to the muzzle and an ineffective rod-type bayonet, stowed in the forearm like a muzzle-loader’s ramrod. The troops complained of the heavy .30-03 bullet’s kick; the Springfield was lighter than previous service rifles and the 220-grain bullet was heavier than necessary. It was also realized that the new German-designed *spitzer* (pointed) bullet was more effective with high-velocity smokeless powder. The .30-caliber M1906 cartridge had a neck shortened by 0.07in and a pointed 150-grain bullet. This would become the popular “.30-06,” which is not an official military designation by any means. In 1905 the trial rifles were recalled and modifications were made to the stock shortening the forearm, a blade-type bayonet was adopted, the rear sight was changed to accommodate the new bullet’s ballistics, and about 2/10in of the barrel’s threaded breech was cut off; all with no change in the rifle’s M1903 designation. (As an aside, the M1903 rifle’s Mauser action was copied without licensing. Mauser sued the US Government, won, and the US paid fees to *Mauser-Werke GmbH* for the action’s design and the spitzer bullet

and the privilege of using them against Germany in the Great War.[115]) In Europe the .30-06 cartridge is called the 7.62x63mm and the 0.30-inch in the UK.

A long popular and versatile long-range hunting cartridge is the .270 Winchester introduced in 1925. It is a .30-06 case necked down to .277-caliber. There are also three comparatively popular wildcat cartridges called the 6.5mm/06 of 1913, .25-06 of 1920, and 7mm-06 (.284-caliber) of the late 1940s that evolved from the .30-06. The .25-06 was standardized by Remington in 1969 losing its wildcat status while the .280 Remington of 1957 using a necked down .30-06 case was derived from the 7mm-06.

A not dissimilar story is found with the Browning .50-caliber M1921 water-cooled antiaircraft machine gun, the first .50-caliber machine gun adopted. The prototype guns used test lots of non-standard ammunition. The standard ball round was adopted in 1923. It was a moot point though as the gun did not enter low-rate series production until 1925.

… And the .30-06 story goes on

The .30-caliber M1906 ball round was standardized with its use in rifles, the main consideration at the time. Machine guns were secondary prior to World War I. Most US units in the American Expeditionary Force were armed with British-designed .30-cabliber Vickers M1915 and French 8mm Mle 1914 Hotchkiss machine guns. These weapons used heavier bullets than the .30-caliber M1906 and achieved longer ranges, essential for effective automatic fire support. Long-range indirect machine gun fire support was a well established doctrine. When some US units finally received .30-caliber Browning water-cooled M1917 machine guns it came as a surprise that they lacked the effective range of their British, French, and German counterparts owing to the much lighter 150-grain bullet. After the war a new .30-06 ball round was developed with a heavier bullet, the 173-grain M1 ball. The bullet's design was based on the virtually identical Swiss 7.5x55mm GP11 ball round used in the Schmidt Rubin M1911 rifle (both the 7.5mm Swiss and .30-06 were .308-caliber). The M1906 ball had a maximum range of 3,400yd and the M1 ball's maximum range was 5,500yd. Adopted in 1925, the new ammunition was not issued until 1936 as the two-billion M1906 rounds in stock first had to be expended. With the issue of the new ammunition, which had been produced and placed in war reserve stocks, two surprises arose. The first problem emerged from

complaints of excessive recoil with bolt-action Springfield rifles; the same complaint experienced with the original 220-grain .30-03 round. The second was the sudden awareness that machine gun and rifle firing ranges had been constructed with limited safety fans for the shorter ranged M1906 ball. The M1 ball exceeded this by over 2,000yd. This was even more restricted on many National Guard ranges, which were often near urban areas. The National Guard Bureau requested that 10-million rounds of the M1906 or similar ammunition be produced for their use, and development was undertaken being completed in 1938. This new 152-grain round, just slightly different from the M1906, but with a higher velocity and range achieved by an improved propellant, was standardized in January 1940 as the M2 ball. During this same timeframe the Garand M1 rifle was undergoing extensive testing and with the adoption of the lighter M2 bullet the rumor spread that it was standardized because the M1 rifle was unable to handle the old M1 ball ammunition, which is untrue.

The M2 ball was adopted to accommodate existing firing range safety fan restrictions, provide a lighter less recoil-prone round, and still archive a higher velocity for longer range. The land was simply not available to expand the size of range safety fans on most posts without sacrificing equally limited maneuver training areas or endangering off-post civilian property. While M2 ball was extensively used in combat through World War II and the Korean War, M2 armor-piercing ammunition was often issued in lieu of ball for improved penetration with M1 rifles, BARs, and machine guns. M2 AP rounds had a 168-grain hardened steel core bullet. Essentially the M1 ball soldiered on as the M73 match round adopted in 1957 backed by a different propellant and made under higher tolerances. This same bullet was subsequently loaded in the 7.62mm M118 match (aka special ball) adopted in 1965. These match rounds were also used by snipers.

Is it true that a SMALLER CALIBER GARAND M1 rifle was almost adopted?

This is true. The T3E2 version of the Garand was almost adopted in 1932 after 13 years of development. Originally the Garand was to be chambered for the .276 Pedersen (7x51mm; actually .284-caliber)[116] using a 10-round

en bloc clip. However, in 1932 then Chief of Staff of the Army, General Douglas MacArthur (1880–1964), assessed that the US might soon be at war and that it would be less than desirable to be caught in an ammunition change, which would require several years: "To make this change will introduce an element of chaos, confusion, and uncertainty which, magnified under war conditions, would more than counteract the beneficial effect of any semiautomatic rifle." He also realistically understood that Congress would probably not spend the massive amount of money to completely rearm the army with new rifles and machine guns, and acquire stocks of ammunition, training aids, and spare parts. There were also questions regarding the .276 round's knockdown power regardless of the success of the Pig and Goat Boards (describing the targets of the firing effects tests).[117] Its value as a heavy machine gun round, owing to its shorter range and light 125-grain bullet, was another consideration.[118]

SPECIFICATION:
M1 Garand

Caliber: 0.30-06in
Operation: gas, semi-auto
Feed: 8-round internal box magazine
Length: 43.4in (1,103mm)
Barrel length: 24in (610mm)
Rifling: 4 grooves, r/hand
Weight (empty): 9.5lb (4.37kg)
Muzzle velocity: 2,800ft/sec (853m/sec)

Another reason for dropping the .276 was that armor-piercing and tracer rounds proved inadequate. Too, it was finally proved that a semiautomatic rifle capable of handling the powerful .30-06 was feasible. The .276 was developed with the notion that .30-06 semiautomatics would be too heavy and inflict too much punishment on the firing system.

The .30-caliber Garand T1E2 rifle was designated the M1 on August 3, 1933, but further refinement was undertaken and it was authorized for

procurement in November 1935 and formally adopted on January 9, 1936. Series production commenced in July 1937. The Marine Corps adopted it in late 1941. From 1942, all deploying army combat units and Fleet Marine Force units by late 1943 were armed with the rugged and reliable rifle making the US the only country fully armed with a semiautomatic rifle.

It's rather slow and heavy
By standards of today
But not too many years ago
It swept the rest away.
– *M1,* Bob Gannon (USMC)

Were WOODEN RIFLE BULLETS really used by the Germans and Japanese?

During World War II there were frequent field reports of the use of wooden bullets by the Germans and Japanese. With the Japanese it was reported the bullets were used to inflict nasty wounds by splintering when they hit a person. It was rumored that this would cause infection, but in reality, no more than any other wood splinter. It was said too that the splinters could not be detected by X-ray.[119] In the case of the German wooden bullets it was assumed they were economy measures to conserve scarce materials – *ersatz* bullets.[120] To some extent, the same was also assumed of the Japanese wooden bullets.

However, both assessments are incorrect. A wooden bullet is far too light to provide a significant velocity or achieve effective combat ranges, much less penetrate through brush. It does not have the ability to penetrate into a human body sufficiently to cause anything more than a superficial wound at all but pointblank ranges. It is doubtful that it would splinter on impact, unless possibly striking a near-surface bone just right – that is, if it could penetrate through clothing layers, flesh, fat, and muscle – and even if it did, the resulting smaller and lighter splinters would have little if any further penetrating effect. They certainly would not have inflicted any serious wounds.

What American soldiers had discovered were blanks and rifle grenade launcher cartridges. Depending on the model of grenade, they used either

solid or hollow wooden bullets. The Germans, Japanese, and many other countries also used hollow wooden bullets of comparatively soft wood on blank cartridges. These shattered into harmless slivers when fired, but as a precaution they were not to be fired directly at personnel within 80ft (25m). They were used because they assured more reliable feed as the wooden bullet's length was the same as an actual bullet. Some German units were conducting field exercises on the night of June 5/6, 1944 when Allied paratroopers descended on Normandy. They carried blank cartridges (*Platzpatronen*) in their pouches and live ammunition in their packs and had to make a quick switch. American soldiers had never seen wooden bullets as US blanks and grenade launcher cartridges had rolled or seven-petal rosette crimps and cardboard closure wads. Earlier US blanks used solid compressed paper bullets, quite hard, that disintegrated when fired. It is natural for soldiers to have assumed the wooden bullets had some other use, either as emergency substitutes for conventional bullets or for some more devious purpose.

The rumors that Japanese snipers were shooting US soldiers in the back with wooden bullets to cause infection arose in the Philippines after the Japanese invasion and the battle of Guadalcanal. On the latter it was because of an incorrect assessment by Lieutenant Colonel Merritt Edson of the 1st Raider Battalion when wooden bullet blanks were found on nearby Tulagi Island.

REMEMBER:
Regardless of the case mouth closure on any blank or grenade launcher cartridge, be it cardboard, compressed paper, wax, or wood, they should never be fired directly at an individual within 15–20m (no less than three full-size automobile lengths). Nothing should ever be placed down a barrel when firing blanks as the type of propellants used are intended to develop high pressures without a confining bullet in order to produce an effective firing report. Even a loose obstruction could cause dangerously high pressure or injure someone downrange. Foreign objects would also have an erratic flight path making it impossible to determine where they will travel.

Another myth persists in regard to wooden bullets: German rifle grenade cartridges (*Gewehr Granatepatronen*) with wooden bullets were identified by different means depending on the type of grenade they were intended to propel. Some had natural colored wooden bullets of distinctive shape, but others were dyed blue or black. German blank cartridges had pale red or pale light violet round-nosed wooden bullets. This coloration led to the rumor that wooden bullets were poisoned to make the otherwise ineffective wood projectiles lethal.

Did the SPANISH use POISON BULLETS during the Spanish-American War?

Besides the then advanced 7mm M1893 Mauser rifles, the Spanish used M1879/89 Remington "rolling block" single-shot, breech-loading rifles during "the splendid little war" as Theodore Roosevelt called it. The Remingtons were chambered for the 11.5x57mmR, commonly known as the 11mm Spanish, 11.5mm Reformado, or .43 Spanish, which was actually .454-caliber. Rather than solid lead bullets, as used by most large-caliber rifle bullets of the era, the 11mm Spanish had a brass-jacketed bullet. This was unusual as cupronickel (60-percent copper, 40-percent nickel), gilding metal (90-percent copper, 10-percent zinc), or copper clad steel was normally used for bullet jackets. Nevertheless, the hard brass jacket improved penetration. In the tropics the brass bullets and cartridge cases corroded and the naturally forming powdery pale green verdigris was suspected to be some form of poison when found by US troops; verdigris is caused by the action of acetic acid when brass, copper, and bronze are exposed to humid air or salty sea air over time. Some also assumed that brass bullets would cause something akin to lead poisoning (ignoring that brass cooking utensils were in common use). This belief was reinforced by the ease with which wounds became infected in the tropics, especially since there were few effective wound disinfectants and antibiotics available.

In truth, neither Spanish nor any other brass-jacketed ammunition is poisonous, nor are any special safety procedures necessary for its handling or storage.

Are poison bullets even PRACTICAL?

The actual use of any form of poison bullet is **extremely rare and mostly impractical**. The Strasbourg Agreement of 1675, an accord between France and Germany, was the first agreement to ban poison bullets. While no details are known, this indicates that at least there were attempts at poison bullets prior to the agreement.

Subsequent agreements, accords, and conventions have also banned them as forms of biological and chemical warfare. Other than a very few "secret agent" type assignations and reports of the Nazis testing poison bullets on Holocaust victims, there are virtually no known incidents of poison bullets being used.

However, one well known incident did occur on September 7, 1978 when Bulgarian émigré, writer, and broadcast journalist Georgi Markov (1929–78) was assassinated in London. He had defected in 1969 and was actively criticizing the Bulgarian government. It is said that he was assassinated by a Bulgarian agent using a special compressed gas projector concealed in an umbrella. It fired a 1.7mm (0.066inch) diameter pellet containing 450 micrograms of ricin into his leg. Unaware he had been shot; Markov was treated for an unidentified blood poisoning, but died three days later.

A myth has long persisted that Mafia hitmen would drip bullets in garlic oil or insert garlic in hollow-point bullets; the theory was that if the target was not killed in the hit he would contract either "garlic poisoning" or, somehow, gangrene, and eventually die. While garlic is ingested as a food spice, it was claimed that if it entered the blood stream it caused some form of poisoning. This is not true, except maybe for vampires. In fact, for years garlic was used as a wound disinfectant to ward off infection. It was found to be ineffective for this purpose before World War II, but it certainly did not poison anyone in the process nor does it cause gangrene. There is such a thing as garlic poisoning, but it requires a huge amount of the spice, something like 130 milligrams per kilogram of body weight and the results might be stomach ulcers, bronchial asthma, anemia, vertigo, suppression of testicular functions, and blood-thinning. It's not usually fatal, even if you can get that much garlic into someone.

Suggestions to dip bullets in a poison would not work as it would be mostly lost to propellant gases, bore friction, and muzzle blast. Inserting a minute amount of poison in a hollow-point bullet and sealing it would be

insufficient to cause serious harm for all except a very few rare, highly potent poisons such as ricin or tetrodotoxin. Hollow-point cavities are very small and a sealant able to resist the high stresses of firing might not rupture on impact. The sealant used in the Markov case was dissolved by body heat, which is why it had to be propelled by gas rather than fired from a more conventional weapon.

There are rumors of poison bullets being tested which contained tiny capsules of poison which were intended to rupture; practicality and costs make the effort pointless. Although there are some rare instances of poison bullets being used, they are mostly an invention of spy thrillers and murder mysteries.

The Soviet 5.45x39mm 5N7 ball round for the AK-74 assault rifle has been called the “poison bullet” by the mujahedeen in Afghanistan when introduced during that conflict. The bullet caused a great deal of internal tissue and organ damage owing to an air space in the tip (it is not a hollow-point), more so than the previous 7.62x39mm round used in the AK-47 and AKM. Wounded fighters, often untreated for days and coupled with the general shortage of antibiotics, quickly developed infections including gangrene. This led to their backward belief that the infections were caused by “poison bullets.” The air space is no longer used in current Russian 5.45mm rounds. In 1994 the 7N10 ball was fielded with the air space filled with lead along with a hardened steel core to improve penetration of body armor, helmets, and typical light cover materials. The 5N7 ball is identified by the lack of a colored band around the case mouth. The 7N6 ball, also with an air space, but a harder steel core, had a red case mouth band. The 7N10 improved penetration ball, lacking an air space, has a purple case mouth band.

How GREASY CARTRIDGES started a rebellion

This entry concerns what was undoubtedly **the most deadly ammunition myth**, originated in British India in the 1850s. It also proved to be an extremely effective propaganda ploy.

The troubles began after the issue of the Enfield Pattern 1853 rifle-musket. Its .577in (14.6mm) cartridge consisted of a 530-grain lead bullet to which a paper tube was glued and filled with 68 grains of black powder.

The new rifle was issued to the Bengal Native Infantry of the East India Company's army in 1857, at the same time that various states were being annexed into India. However, many of the sepoys were not exactly amenable to annexation.[121] The Bengal Army was comprised of Muslims and Hindus, but there were suspicions that the British were making efforts to convert them to Christianity.

The .577 Enfield bullet was lubricated with tallow, which is rendered from beef, mutton, or pork fat and rumors spread by agitators claimed the cartridge were lubricated with pig or cow fat. Muslims considered pigs to be unclean and cows were sacred to Hindus. Much discontent was expressed by the 19th and 34th Bengal Native Infantry Regiments at Lucknow. However, they had not yet been issued the rifles (the units were still armed with the Brown Bess musket) and the cartridges in the armory were unlubricated. The paper tube for the new cartridges was a different color leading to the sepoys suspecting they too were tainted. (The paper was in fact coated with waterproofing beeswax and linseed oil.)

At issue was how the cartridges were loaded into the rifles. The twisted and tied off lower end of the paper cartridge was torn off with the teeth and the powder poured into the muzzle. The cartridge was reversed and the bullet inserted in the muzzle, the excess of the paper was torn off and the bullet rammed home. The main problem with this was that any animal grease on the cartridge would come in contact with the rifleman's mouth.

To calm the situation the British imposed certain measures: existing greased cartridges were issued only to European troops; native troops were to prepare their own grease with substances of their choice to lubricate the Enfield cartridges; the drill for opening the cartridges was changed from biting with the teeth to tearing open the cartridges with the fingers – however, this was considered unsatisfactory by the native troops as well, as they had been long drilled by the traditional method and this drill was slower and awkward.

Despite the British proposed alternatives, the units refused to accept the suspected tainted cartridges and the sepoys refused to obey orders. There were also rumors the British had tainted wheat flour with ground bullock bone-dust. These rumors, spread by agitators, and coupled with the political concerns of annexation and attempts to spread Christianity led to a general uprising. The particularly vicious rebellion resulted in hundreds of thousands of deaths.

Is the 7.62mm M118 match cartridge, an OPEN-TIP BULLET, illegal to use against personnel?

The US 7.62mm M118 long-range cartridge is used in both competitive shooting and sniping. This 173-grain bullet appears to be a hollow-point, which is technically prohibited by the Hague Convention as a **"dum-dum"** bullet. This "hollow-point," however, is 1mm in diameter and 2mm deep (about 1/16in) and is referred to as an **"open-tip."** Hollow-point hunting ammunition has wider and deeper cavities. The M118LR cavity does *not* extend into the lead core of the bullet beyond the jacket as do hollow-point hunting bullets. In 1985 the M118 was approved for use for combat snipping against personnel. Bullets recovered after penetrating into a sand berm 8 to 10 inches demonstrated no mushrooming or jacket peel-back. It was also tested in animal cadavers and gelatin blocks with the same result. Extensive testing has proved that the open-tip bullet with a tiny cavity improves accuracy – also called "open-tip match" (OTM). The bullet may fragment when striking certain target materials, but no more than any other 7.62mm full metal jacket ball round. Since it is not a design characteristic for M118 bullets to fragment it was determined that the tiny open-tip bullet meets the Hague Convention criteria.

In 2006 a US Army Judge Advocate General (JAG) officer ordered all snipers to halt the use of M118 ammunition after she unilaterally decided it was in violation of the Hague Convention and issued a directive prohibiting its use. Snipers were forced to de-link M80 ball machine gun ammunition, which is much less accurate than the M118 owing to the lack of the open-tip, mass-produced bullets, and a less than precisely loaded propellant rather than the M118's special propellant and close tolerances. This endangered the lives of US and allied personnel as well as Iraqi civilians. The order was later revoked for a number of reason: firstly, there is a presumption of legality for all weapons and ammunition approved for use in combat as their legality has already been studied and approved – the M118 had been earlier officially approved for use against personnel; secondly, the JAG officers' role is to "advise" commanders, *not* issue directives. It is perfectly legal to fire 7.62mm M118 open-tip and other issue open-tip rounds at enemy personnel.

Open-tip rounds in the US inventory include:

Model/Mark	Bullet weight	Remarks
7.62mm NATO		
M118	173-grain	match grade
M118SB	172-grain	special ball
M118LR	175-grain	long-range
M852	168-grain	match grade
Mk 316 Mod 0	175-grain	special ball, long-range used by Navy.
Mk 319 Mod 0	130-grain	used by SOF
5.56mm NATO		
Mk 262 Mod 0/1	77-grain	special long-range
Mk 318 Mod 0	62-grain	ball, carbine, barrier (aka SOST = Special Operation Science and Technology) used by SOF and Marines

The military .45 ACP M1 tracer (red tip) produced at Frankford Arsenal through World War II had a small '+' in its round-nosed tip. Remington-produced M1 tracers did not. The very shallow + did not penetrate the jacket and was unnecessary for the functioning of the tracer. It was intended to provide identification of unpainted tracer bullets so as not to confuse them with ball rounds during production. The shallow + did not cause the bullet to mushroom or break open the jacket in any manner.

Was GERMAN MILITARY AMMUNITION properly called 7.92mm, 7.9mm, or 8mm?

Most references give the caliber of German World War II weapons as 7.92mm, but this is not actually the correct designation. The Germans officially called it *7,9mm* (0.323in – 8.08mm); note the use of a comma rather than a decimal point as was non-English-speaking practice. The 7.92mm designation was used by Czechoslovakia, which produced and widely exported 7.92mm rifles and machine guns prior to the war. The British used Czechoslovak-designed, British-made Besa tank machine guns in 7.92mm and retained this caliber designation. In the European metric system of designating cartridges it was known as the 7.92x57mm JS or 8x57mm JS *or DWM Patrone № 561.* It was common for the caliber to be rounded out and referred to simply as 8mm on the *civilian* market. In the US the 7.92x57mm is sold commercially as the 8x57mm or 8mm Mauser leading to more confusion. Descriptions of German World War II 7.9mm weapons in some reference books are incorrectly identified as "8mm." The 7.92x57mm JS designation is partly incorrect too, as the "J" is actually an "I." When the cartridge was adopted the Germans used Gothic script *(Fraktur)* in which upper case "I" and "J" are similar - 𝔍 (I) and 𝔍 (J). Some references state the Gothic "I" and "J" are "interchangeable," but they are not, and are different, albeit, similar style letters. The "IS" means *Infanterie Spitz* (literally "infantry, point") meaning a pointed *(spitzer)* bullet for combat use. It was also colloquially known as the *7,9mm Militärpatrone* (military cartridge) or *Gewehrpatrone 98* (rifle cartridge 1898). The 7.9mm IS cartridge was adopted in 1905. It was preceded by a different cartridge today called the 7.92x57mm J or 8x57mm J or *DWM Patrone № 366,* the "J" again actually being an "I" for *Infanterie.* This was a slightly smaller caliber 0.318in (8.07mm) cartridge with a heavy round-nosed bullet adopted in 1888 for Germany's first magazine-fed, bolt-action rifle, the Mauser Gew.88, which was used up to World War I. It was being replaced by the Gew.98 rifle adopted in 1898. The "I" cartridge could be fired in "IS" caliber chambered rifles, but not vice versa. From 1905 most 7.9mm "I" caliber rifles still in the German inventory were re-barreled to the 7.9mm IS, which necessitated a change in rear sight range scales.

SPECIFICATION:
Mauser Gewehr 98

Caliber: 7.92 x 57mm
Operation: bolt-action
Length: 43.3in (1,259mm)
Barrel length: 29.1in (740mm)
Rifling: 4 grooves, r/hand
Weight: 9lb (4.1kg)
Muzzle velocity: 3,280ft/sec (1,000m/sec)
Magazine: 5-round

The confusion over "J" and "JS" for "I" and "IS" was caused by British Intelligence in World War I mistranslating Gothic "I" as a "J" and publishing it in handbooks on the German forces. This mistake was passed on as the fledging US Army reprinted British publications. To confuse matters even more, there is also an 8x57mmR *jagdpatrone* or *DWM Patrone № 446,* a rimmed cartridge used in civilian hunting rifles.

The short 7.9mm cartridge used in the MP.43, MP.44/StG.44 assault rifles was officially designated the *Pistolenpatrone 43* (pistol cartridge 1943 – a cover designation for its development) and its 7.9mm caliber was *not* included in its complete official designation. Since the ammunition boxes were not marked with the caliber it may have sometimes been confused with 9mm pistol/machine pistol ammunition, which too were not marked with the caliber.[122] It is commonly called the 7.92x33mm or 7.92mm *kurz* (short) or *7,9mm kurzpatrone* (short cartridge). In English it is usually shown capitalized as "Kurz."

If one wishes to be correct one should refer to German and Polish World War II weapons as "7.9mm," the official designation. Weapons of Czechoslovakian and British origin can be referred to as "7.92mm" as was their practice. Furthermore, 7.9/7.92mm military weapons should never be call "8mm;" it's amateurish.

How dangerous is the OVERHEAD MACHINE GUN FIRE in INFILTRATION COURSES?

Up until the late-1970s a standard training exercise in US Army Basic Combat Training was the live-fire night infiltration course. All soldiers undertook it whether they would serve in combat arms or not. It is now only conducted during infantry training as a cost-saving effort. Machine guns are fired over the heads of trainees low-crawling from a trench-line toward the machine guns with tracers zipping inches over their heads, demolition pits exploding to shower dirt and mud all about, while they crawl around and under barbed-wire obstacles, and floodlights randomly switch on and off to simulate illumination flares (mainly to catch anyone up on their hands and knees rather than belly-crawling). How dangerous is it?

The answer is it's extremely safe. There are Army regulations dedicated to the conduct of this exercise. The well-maintained machine guns are mounted on concrete platforms about 5 feet above ground level. The barrel cannot be depressed as there is a horizontal steel bar preventing depression. Nor can it be traversed more than a couple of inches. The machine gun barrels have an upper limit on the number of rounds that can be fired through them and this is recorded in a log book. The guns cannot be used for any other purpose. Specially loaded 7.62mm M80 ball and M62 tracer ammunition designated "Overhead Fire Application," with their own special order DODAC codes[123] are used (1305-A166 for ball, 1305-A167 for tracer) plus the tracers have red instead of orange tips as normal M62 tracers to provide easy identification of the ammunition belt. The cartridges have no other identifications means in regard to their special loading. The machine guns are set to fire well above ground level and do not actually fire directly over the heads of the crawling troops. The crawl lanes are canalized in a zigzag pattern between the three or four machine guns so that even an individual jumping up and down cannot be hit much less one who raises his head a few inches out of the mud. The streaking tracers and crack of the bullets overhead make it easy to convince troops they are undertaking a deadly hazardous exercise and that they had better hug the ground for all they are worth. It is a long crawl and hard on the knees.

It is a shame that the night infiltration course is no longer provided to all personnel. It is a great confidence builder and exposes soldiers to a slight taste of combat with an adrenalin rush and the sights and sounds of battle.

So what happens when a BULLET IS FIRED STRAIGHT up?

Tests to answer this question were conducted by the US Army in the 1920s. When a bullet reaches its apogee (its highest point), it actually stops for a microsecond before dropping earthward. I guess if you happened to be at the exact right place and were quick enough you could grab it (gloves and eye protection are recommended if you should attempt this). A 9mm Parabellum will travel to about 4,000ft (1,220m) in just under 40 seconds and a .30-06 to approximately 10,000ft (3,050m) in just under 60 seconds. A bullet will usually fall earthward base first, its heavy end, and not point down. Depending on the bullet design and balance it might tumble. An exception is the shotgun rifled slug, which is nose heavy and has a deep hollow base. A falling bullet will accelerate from zero until a point is reached where its weight equals air resistance, its terminal velocity. It will gain no faster speed regardless of the distance. (The same as with a penny dropped off the Empire State Building; it will not kill someone as urban myth claims.) The army tests with .30-caliber bullets found that they fell at 300ft/sec and would impact with only 30-foot pounds of energy. Such a falling bullet made a 1/16in (1.58mm) dent in a pine board. In theory this should not kill a person, but if striking in the right – or wrong – place, depending on your perspective, it could be fatal or cause a serious injury.

Regardless, there are confirmed reports of fatalities and injuries in Los Angeles and elsewhere owing to numerous firearms discharges during New Years and other times of celebration, while professional roofers occasionally find bullet marks in composition roof shingles. This no doubt occurs in the Middle East when certain excitable individuals blast off bursts of “joy shots” for whatever celebratory events enliven or agitate them. The fact is that rounds fired even a few degrees from vertical, much less at a lower angle, can certainly be fatal as they do not experience a complete loss of velocity as a truly vertically fired bullet. A steeply descending bullet, even at a long range, can be just as fatal as one fired directly at a person. This is very well described in a novel called *Swallowing Stones* (Joyce McDonald, 1999).

If fired at long enough range, air resistance will eventually retard a bullet’s velocity resulting in a “spent bullet,” such a bullet will usually not be deadly. A spent bullet should not be confused with a “spent casing,” which is the same as an expended (fired) cartridge case. (I love it when a movie cop holds up a complete cartridge with bullet and case and says, “This is the slug we dug outta him.”) Of course we do have photographic

proof that the entire cartridge flies downrange when fired – bullet, case, and primer.

Is it true that one should never fire 100-percent TRACERS in a weapon?

It is often claimed that firing 100-percent tracers in weapons will "burnout the barrel," build up tracer residue in the bore, or otherwise somehow damage the weapon. This is not true, although early tracers did cause fouling. Subsequent bullets "clean out" what little residue that might occur. There is not much. Many modern tracers do not ignite until well after they have left the muzzle (see "Is it true that green tracers *always* indicate the enemy" below). The M231 firing port weapon is fired with 100-percent tracers as is the 25mm M242 Bushmaster chain gun on M2 and M3 Bradley fighting vehicles. If there are still concerns about firing 100-percent tracer then load every other round with a tracer.

There is one possible disadvantage with high-density tracer fire; that is the illumination effect. The solid tracer stream may dazzle the gunner at night and if numerous weapons are firing it may illuminate one's own advancing troops. These factors must be assessed if using high-density tracer fire. However, they can also illuminate the immediate target area.

In World War II some units loaded machine gun belts with alternating tracers (today's standard 5.56mm, 7.62mm, and .50-caliber belts are loaded with four ball to one tracer [4:1]; all 25mm chain gun rounds have 100-percent tracers). German prisoners attributed the failure of their attack on Bastonge, Belgium on the morning of December 30, 1944, in large part to the lavish expenditure of tracer bullets by the defending 101st Airborne Division. All prisoners questioned stated that the illumination caused by the tracers made every soldier feel that he could go no further without being spotted and that their morale was lowered considerably because every tracer bullet "looked as if it were coming right at you." Even enemy troops who had already seen five years of combat, including the Stalingrad battle, commented that the display was more frightening than anything they had experienced previously.

In World War II the British found that machine guns firing high densities of tracers give the enemy the impression that the fire is coming directly at

them (when it might actually be impacting to the flank or even going overhead), that the weapons are firing at an extremely high rate, or that there are more weapons firing than there actually are, and/or they are of much larger caliber than they actually are. They feel that this is valuable when using machine guns for suppressive fire. British aircraft attacking ground targets would sometimes use high-density tracers in an effort to suppress enemy light antiaircraft gun crews. One famous incident in which the British used tracers in this manner was the 1943 raid on the Ruhr Valley dams by Avro Lancaster B III (Special) bombers of 617 Squadron ("The Dambusters"), although this was not depicted in the *The Dam Busters* (1955) motion picture; perhaps it will be in the upcoming remake.

A 1:1 or 2:1 ball to tracer ratio will definitely achieve this psychological effect. This includes rifles and machine guns used in the air defense role discussed below. In a similar vein .50-caliber incendiary, API, and API-T rounds have a strong physical and psychological effect on downrange personnel. The impacting bullets appear, especially to inexperienced troops, to be 20mm or 25mm cannon rounds due to the flash, noise, spraying dirt and dust, bullet fragments, and secondary fragmentation. Tracer fire also has a favorable psychological effect on the troops being supported. In one World War II incident a quad-fifty battery tasked with supporting an infantry attack planned to remove the tracers so as to reduce the possibility of their firing positions being detected as they placed suppressive fire on the objective. Learning of this the infantry requested they use tracers as it had such a high effect on morale and would further demoralize the enemy. The AA troops granted their request deciding it was worth the risk in aid of the infantry having to close in on the attack.

The high-density use of tracers is also extremely effective when using small arms in air defense, be it rifles or machine guns. During the Falklands War the British employed all available machine guns aboard ships. While well-armed with modern air defense missiles, close-defense weapon systems, and effective air defense aircraft intercepting incoming Argentine air attacks, the machine guns were invaluable. They were set up everywhere on ships and ashore. Argentine pilots admitted that the maze of crisscrossing tracers severely distracted them, appeared to be of heavier caliber fire, and often forced them to abort an attack run or miss their target. Also, the tracers have a higher chance of causing fires on the aircraft when hit.

The British used high-density tracers for another purpose in Northern Ireland. With the L7A1 (British equivalent of the US M240) machine gun they used 1:1 ratio ball and tracers in order to better detect the fall of fire at longer ranges. This aided them in preventing or reducing collateral damage in a sensitive urban and rural combat environment where civilians and livestock were present. It must be kept in mind that the burning of the tracer element changes the bullet's weight and center of gravity and that the tracers may not impact exactly where the accompanying ball rounds do. However, even at several hundred meters the difference is minimal and certainly unimportant when measured in inches. The appearance of erratic tracers is enhanced by tracer elements separating (called "floaters") from the bullet upon impact and arching off at extreme angles. They appear to "float" slowly into the air, an optical illusion as they are ricocheting away from the viewer and upward at a low angle.

Is it true that one should never use TRACERS to INDICATE YOUR WEAPON IS NEARING EMPTY?

One of the most valuable uses of tracers is to signal when a weapon's magazine is almost expended. The tracer should *not* be the last round in the magazine, but rather the fourth round from the bottom; the 27th round loaded in a full 30-round magazine or the 25th round loaded if the magazine is loaded with only 28 rounds to relieve spring pressure. This alerts the firer that his magazine is almost empty and allows him to be prepared to reload and not wait until he is completely empty before finding out. In Vietnam some troops simply made the last three rounds tracers.

In a pistol the second to the last round can be a tracer, although there are no 9mm tracer rounds in the US inventory (they can be purchased from commercial sources). When the tracer is fired the last round is chambered and the firer is so alerted. The empty magazine can be changed without having to re-cock the weapon thus saving time and avoiding a possible misfeed when releasing the slide to chamber the first round in the fresh magazine. Various special operations forces have long used this technique.

Some recommend that this low magazine indicator technique should not be used as it will alert the enemy that you are low on ammunition and that you will soon be changing magazines. However, it is seldom that the enemy

will be aware of this technique or that he will relate a single tracer zipping past to a low magazine of a particular individual, if he even notices the tracer. How does he know the tracer was intended as a low magazine indicator and not just another tracer from an automatic weapon?

Fighter aircraft sometimes had a short section of belt near the end of the load loaded with 100-percent tracers to let the pilot know he was nearly out of ammunition. It has been suggested that this may have alerted enemy pilots that a plane was out of ammunition, but again it is very doubtful that in the high-speed maneuvering of aerial combat with tracers flying past, and pilots' attention directed in so many directions and at his instruments that this will be noticed and interpreted as such.

Is it true that GREEN TRACERS *always* indicate the enemy?

It has long been said that green tracers are used in all Warsaw Pact and Communist Bloc weapons, which are still found in wide use throughout the world. However, this is not always true and **tracer colors should *not* be relied on** for friend-or-foe identification. While green tracers predominated in the Warsaw Pact, some of these countries used red tracers, which still had green bullet tips, the standard Warsaw Pact color code for tracers. Today Chinese-made tracers are usually red while most Russian 7.62mm tracers are green. However, the current Russian 5.45mm tracer burns red; they are all still marked with green tips. It can be confusing; for example, Yugoslavia produces a direct copy of the 7.62mm NATO M62 red-burning tracer, but it has a green rather than an orange tip.

Other colors of tracers may occasionally be encountered throughout the world to include orange and white. Virtually all US and NATO tracers burn red, but there are exceptions. For example, the US .50-caliber M17 tracer (brown bullet tip[124]) initially burns a short distance in dim green then changes to bright red. Similarly, US Special Operations Command requested .50-caliber M17 tracers that burned green during the 1990–91 Gulf War. This was to allow vehicle-mounted Special Forces units operating behind Iraqi lines to create confusion with green tracers and not be identified as American by red tracers.

Some claim, or assume, that the tip of tracers burn. However, they burn only at the base end. They can still be seen when a tracer comes at an

individual because of the glow of the tracer flame. In fact in 1945 the US developed the .50-caliber M21 tracer (red tip) known as the "headlight tracer" for use in aircraft guns. It burned three times brighter than the standard .50-caliber M1 tracer giving the impression that a larger caliber weapon was being fired when the rounds were coming at the target. This had a strong psychological effect on enemy pilots. Tracers are often difficult to detect in daylight. Sometimes gunners aboard bombers wore red-filtered goggles, which made tracers more visible in daylight.

Tracers obviously do not necessarily burn in the color marked on the bullet tip as is sometimes rumored, be it red, orange, violet, maroon, brown, white, or green; if they do it is only by coincidence. Into the 1920s US tracers were identified by blackened cartridge cases. Besides bullet tip colors some countries identified tracers by primer annulus colors or colored rings around the case mouth or blackened bullets or cases.

In World War II the Japanese used pink and pale blue tracers, which US soldiers and Marines thought were wimpy … but would still kill them. The Russians used red tracers, but some first burned red then green. Soviet green tracers were a post-war practice. The Italians used red, white, and green tracers, their national colors, which is pretty cool. The Germans used tracers that first burned red then green (sometimes described as greenish-white) or the reverse. They also used special very dim tracers (*Glimmspur*) that could only be seen when fired in bursts so as not to temporarily dazzle the gunner. Other colors were used in larger caliber automatic cannon antiaircraft rounds. The Germans frequently armed some units with captured/impounded foreign machine guns so other colors of tracers would be encountered; blue, yellow, and green tracers were reported. American and British tracers were red; although prior to and early in the war the US also used green to a limited extent. British red tracers often appeared as bright pink.

Tracer compositions consist of magnesium fuel, one to three oxidizers (providing the color), and a binder. Sometimes there is a sensitive igniter compound at the base of the tracer element. Regardless of what many sources claim, modern tracers do *not* contain phosphorus. A tracer wound is cauterized or scorched by the magnesium flame though, which can be a good thing in a sense as it might reduce bleeding. Residual particles can conceivably inflict chemical injuries to the eyes, skin, and respiratory tract.[125]

There were also “smoke tracers,” aka “Buckingham incendiary-tracers,” originated by the British as the first tracers being fielded in 1916. The idea for smoke tracers is said to have originated from muzzle-loading musket bullets. Some types of grease used as lubricant smoked as the bullet traveled downrange allowing soldiers to track its path. With automatic and rapid-fire weapons tracers allowed the shooter to adjust fire. Smoke tracers fell from use by World War II, but saw much use in World War I, mainly in aircraft machine guns. They held a phosphorus filler with a tiny hole in the side sealed by a very low melting point solder. When loaded in the cartridge case, this hole was inside the cartridge’s neck protecting it. Firing immediately melted the solder exposing the phosphorus to air and igniting it as the bullet emerged from the barrel. It left behind a thin spiraling thread of white smoke and was also an effective incendiary bullet if any phosphorus remained at impact and the jacket ruptured. They were of little use at night. The motion picture, *Flyboys* (2007), depicted black smoke tracers. This is a Hollywood invention to allow the spiraling CGI-generated smoke trails to be seen against the backdrop of white clouds.

There are other types of modern tracers. In World War II the “double-tracer” made its appearance. This was a two-stage tracer with the first stage burning very dim and the second stage burning brighter. This makes it more difficult for the enemy to detect the firing position and the tracers do not dazzle the firer’s vision. The two stages could burn in two different colors or the same color. Many modern tracers possess a brief delay element that does not ignite the tracer until it is some 100 meters or more downrange. This serves the same purpose as the double-tracer, to eliminate the “tracers work both ways” phenomenon. The most recent addition to the tracer family is the “dim tracer.” These tracers burn with an extremely dim trace that is invisible or almost invisible to the naked eye, but detectable by weapon night vision light-amplification sights and goggles and thermal sights. Dim tracers cannot be used in daylight, or rather, cannot be observed in daylight. Current US dim tracers have a dark violet bullet tip.

Is it true that M16 RIFLE BULLETS TUMBLE in flight?

The 5.56mm 55-grain M193 and the newer NATO standard 62-grain M855 ball rounds, as well as the 77-grain Mk 262 Mod 0/1 special long-range ball

used in M16-series rifles, have often been called **“buzz-saw bullets”** and said to tumble in flight or tumble through human flesh once striking a person.

The reality is different. Most small-caliber, high-velocity bullets are inherently unstable owing to the poorly balanced bullet; light in the nose and heavy in the base. Bullets really want to fly with the heavy end forward, but their spin-stabilized rotation keeps the point oriented forward. It might yaw in flight, but it does not naturally tumble. Being unstable, so light a bullet traveling at a high velocity can easily be deflected by even small twigs. In this case the bullet most likely will tumble, be defected to extreme angles, and not continue downrange on its intended trajectory. The bullet could break up as well. The same happens when the bullet penetrates light materials such as sheetrock, plate glass, or exits a human body. The validity of the myth was enhanced when bullet holes were seen in paper and cardboard targets that appeared to strike sideways. The assumption was that the bullet was tumbling before it hit the target. This was caused because the high-velocity bullet, at a short range, immediately became unstable when striking the target and “key-holed.” In 1978 the Stockholm Peace Research Institute urged that small-caliber high-velocity ammunition like the 5.56mm be restricted by international law.

When striking a human the bullet becomes unstable in the same manner. Depending on the angle it strikes a body, its velocity at the instant of impact, and what combination of tissue, muscle, organs, voids, bone, etc it passes through, it may tumble half a turn, heavy end first. Becoming unstable on impact the bullet may travel up to 4 to 5 inches in dense tissue and will attempt to orient itself heavy end first. It might make a 180-degree turn around its center of gravity, but that is all, it does not continue to tumble or “buzz saw.” Additionally, the bullet is banded by a cannelure, a shallow knuckled groove around the bullet to which the cartridge case mouth is crimped. If striking bone it might break in two at the cannelure and some bits of the lead core and jacket might be expelled. This is especially possible at ranges under 100 meters owing to the high velocity. However, the bullet does not normally break up in smaller fragments. At longer ranges it only makes the 180-degree rotation after impact owing to velocity decrease. These dynamics are caused by physics and not by design. For 5.56mm weapons with a barrel under 14.5in, like the XM177-series submachine gun and M4 carbine, this does not normally occur because of

the lower velocity. This characteristic, instability of lightweight high-velocity bullets, is the cause of the 5.56mm round's main ballistic flaw, poor ability to penetrate typical materials used for cover.

The twist ratio of the weapon's rifling has much to do with the bullet's stability and accuracy as does the bullet's weight. M16 and M16A1 rifles, XM177-series submachine guns, and the M231 firing port weapon used the 5.56mm 55-grain M193 ball round and had a rifling twist of 1:12inch (one full turn in 12in). In 1980 the 62-grain M855 ball round was adopted by NATO (STANAG 4172, the Belgian SS109 round, which bears different designations in different countries). With a steel core it provides slightly better penetration, but it is only seven grains heavier than the M193 ball.[126] This heavier bullet is more stable with 1:9inch rifling. To accommodate it the M16A2 and M16A4 rifles, M4 carbines, and M249 SAW are provided with a 1:7inch twist. It is most effective for 40- to 60-grain bullets and 1:9inch is best suited for 55- to 70-grain, but the 1:7inch twist was selected as a compromise to accommodate the new M856 (L110) tracer. There is an overlap in bullet applications. Some believe that one type of ammunition cannot be fired safely in the other's weapons. This is not true. Both types of rounds can be fired in any of the weapons. Accuracy will suffer, but only slightly and certainly not enough to affect combat firing at ranges under 200m, ranges at which most engagements occur.

There have been bullets intentionally designed to tumble. The British introduced the .303 Mk VII ball round in 1910, their first spitzer bullet. This was a 174-grain full metal jacketed pointed bullet with a flat base. The front third of the Mark VII bullet was filled with aluminum, tenite (cellulosic plastic), or compressed paper, instead of lead. This moved the center of gravity to the rear making it tail heavy. Although the bullet was stable in flight due to the rifling, it behaved differently when hitting the target and decelerated. Its heavier lead base caused it to yaw violently and deform to inflict more severe wounds. Regardless, being full metal jacketed, it complied with the Hague Convention and remained the standard .303 ball round. For this reason during World War II the .303 round often caused more serious wounds than the German 7.9mm, Japanese 7.7mm, and US .30-06, all of which were more stable bullets.

Is it true that "Cop-killer" KTW armor-piercing bullets penetrate Kevlar® body armor because of their Teflon® coating?

KTW armor-piercing (AP) bullets were developed by Dr. Paul J. Kopsch, Dan Turcus, and Don Ward (their last initials providing the designation; Turcus and Ward were police officers). They saw a need for police to fire on hostile criminals in vehicles, which could not always be penetrated by conventional police ammunition, usually semi-jacketed hollow-points. KTW, Inc. of Lorain, OH was established in 1968, but they did not enter into a manufacturing and marketing agreement with North American Ordnance Corporation (NAOC) until 1980. Both companies sold the ammunition only to law enforcement agencies or individual law officers.

Anti-gun critics claimed two police officers wearing Kevlar® body armor vests were killed by KTW rounds resulting in the ammunition being dubbed "cop-killer bullets." This was proved untrue and in so far as is known no law enforcement officers have ever been killed by KTW bullets in the hands of criminals; both of the incidents involved normal bullets and not KTWs.

KTW bullets were made in .25 ACP, .30 Carbine, .32 ACP, .380 ACP, 9mm Parabellum, .38 Super, .38 Special, .357 Magnum, .44 Special, and .45 ACP. The conical bullets were solid machined brass and coated with pale green-colored Teflon®. The lawmakers sponsoring legislation to outlaw the sale of AP handgun ammunition claimed the Teflon® coating increased penetration ability by 20 percent, which is not true. The media, however, encouraged by antigun advocates, picked up on these rumors and incorrectly assumed the Teflon® coating improved the ability of KTW bullets to penetrate soft Kevlar® body armor. This resulted in such headlines and stories as "Deadly Teflon Bullets Blast Through Police Vests" and "penetrate a bullet-resistant vest like a knife through hot butter."

The "Cop-killer" bullet myths have been reinforced by unrealistic Hollywood portrayals, such as *Lethal Weapon 3* (1992), which depicts such bullets penetrating ½in (13mm) thick hardened steel.

It has also been argued that these bullets were too powerful for any type of "safe" law enforcement use. However, to counter this, it can be said that they were designed to penetrate automobiles when standard ammunition could not; they were not meant for daily service use, but for special

purposes in order to save the lives of law enforcement officers and potential crime victims.

Legislation was passed in 1986 (H.R. 3132) outlawing the sale of any armor-piercing ammunition which may be used in handguns, other than to law enforcement agencies and the armed forces. The sale of rifle-caliber armor-piercing ammunition to civilians is legal as are explosive, frangible, and tracer ammunition in some states. Ammunition legality varies widely between states and local laws should be checked by individuals seeking special purpose type ammunition for whatever reason.

The "cop-killer" label has also been stuck to the FN 5.7x28mm (.224-caliber) Five-seveN pistol designed specifically to penetrate modern Kevlar® body armor. It will not penetrate Level IIIA body armor that can stop 5.56mm NATO rounds. The media often reports the Five-seveN being dubbed the "cop-killer" as it "packs so much firepower" based on the body armor-penetrating bullet and having a 20-round magazine. The Five-seveN pistol is known for its infamous part in the November 2009 Ft. Hood terrorist attack killing 13 people and wounding 29. While a variety of 5.7mm commercial cartridges are available for civilian use, the SS190 armor-piercing for defeating body armor, SS191 tracer, and SS193 subsonic ammunition is prohibited from sale to civilians. Only the military and law enforcement may purchase those rounds. Regular 5.7mm ammunition approved for commercial sale was used by the Islamic terrorist at Ft. Hood.

Recently .50-caliber sniper rifles, available on the commercial market for private purchase, have been dubbed as "cop-killer guns" for some undetermined reason, and ".50-caliber terror rifles." In so far as can be determined, they have never been used against US law enforcement officers at the time of writing nor have they been fired in the course of criminal activities. A number have been confiscated from criminals, but never used by them in the commission of crimes.

FACT:
Teflon® added nothing to the bullet's penetration ability, but helped reduce bore wear caused by the extremely hard solid brass bullet. Teflon® has also been used to coat regular bullets to help clean the bore when fired. Most of the Teflon® is lost when the bullet races down the bore.

Is it true that BULLETS EASILY IGNITE GASOLINE in fuel tanks?

We often see in motion pictures and television shows someone firing a weapon into a car and it igniting into a bellowing fireball as the gasoline tank explodes. **This seldom occurs and is a Hollywood fabrication.**

Bullets are not hot enough from the igniting propellant and barrel friction to ignite the flash point of gasoline and other petroleum fuels. Flash points vary depending on the type and octane of the fuel. Diesel and the newer types of aviation fuel such as JP-8 are even harder to ignite.[127] The gasoline itself is not ignited, it is the vapors. This means that a fuel tank has to be partly empty and filled with fumes to ignite. Even then it will not always "blow up." The same applies to fuel drums and storage tanks.

Since a hot bullet will not ignite gasoline fumes what does? Sparks created from penetrating the container is what ignites the vapor. Tracer and incendiary bullets can ignite fuel, but again, vapors must be present. The author once fired .50-caliber machine gun tracers into a 55-gallon drum of gasoline set in the barbed-wire barrier at his Special Forces camp in an effort to burn off high grass. The drum peed streams of burning gasoline, but there was no spectacular billowing fireball!

It is interesting to note that while handgun bullets are shown "penetrating" automobile bodies and interior metal barriers, movies also depict handgun, submachine gun, and rifle bullets ricocheting off thin sheet metal bodies resulting only in sparks and dents in the paintjob.

Does the new US WHITE SMOKE HAND GRENADE replace the old model?

The standard US white smoke hand grenade is the **AN-M8** and is filled with hexachlorethane-zinc (HC) providing an excellent dense screening smoke. It has been in use, with slight manufacturing changes, since the 1920s. HC is harmful if breathed for a prolonged period because of its zinc content plus it displaces oxygen. Chemical protective masks provide no protection from oxygen displacement; that requires an air supply source.

To provide a safer alternative, the **M83 white smoke grenade** was introduced in the late 1990s. It is filled with safer terephthalic acid (TA) and is used for training only, signified by a light blue band on the light green body (light blue indicates training and practice munitions). There is a widespread belief that the M83 was intended to replace the AN-M8 as the standard combat screening smoke grenade, which is not true. This misconception is due to incorrect information provided in FM 3-23.30, *Hand Grenades and Pyrotechnics*, September 1, 2000 (previously FM 23-30).[128]

To clarify, the M83, which generates less dense smoke and is of shorter burn duration, is intended only for training and the AN-M8 is still the standard combat screening smoke grenade.

FACT:
M18 colored smoke grenades (red, violet, green, yellow) are also undergoing improvement to make them safer and more reliable. The toxicity of dyes is being studied along with the removal of sulfur compounds from the smoke mixtures. The goal is to retain the color vividness, smoke density, and burn duration of the earlier grenades. In Vietnam it was discovered that the green smoke, but not other colors, drove off swarming bees, a serious hazard. Sugar-based dyes are now being used in the green and yellow smokes. It is doubtful that the new sugar-based green formula will discourage bees.

What was the "conscience bullet" used by execution firing squads?

The practice in some execution firing squads was that one man was given a **blank cartridge** so that the firing squad would not bear the collective "guilt" of executing a condemned person – "diffusion of responsibility."

The use of this "conscience round" has been frequently practiced, but serves little purpose. The problem is that blank ammunition does not generate even the slightest amount of recoil so any soldier firing a blank knows that he did not fire a live round. If using a semiautomatic rifle the

expended blank case would not be ejected. A blank adapter is required for a semiautomatic weapon to function and the attachment of such a device on the muzzle is obvious. However, while blank-firing rifle reports are also not as loud as or are of a different pitch than those firing service ammunition, it would be difficult to determine which fired the blank during simultaneous discharge. Similarly, it would also be difficult, especially in daylight, to determine the difference according to muzzle flash and smoke.

As an aside, very few US states use or have used firing squads as a means of capital offense executions, however, Utah banned firing squad executions in 2004 while Idaho passed a law banning them in 2009. Nevada retains it as an option, but its only firing squad-execution was in 1913. The last US military executions by firing squad were in 1945. There are few countries still practicing execution by firing squad today, and most of those that do now involve a single executioner.

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[109] Commonly known as the 7.62x25mm Tokarev, it is interchangeable with the obsolete German 7.63x25mm Mauser pistol round.

[110] The 9mm Police (aka 9x18mm Ultra – .355in), in limited use in Europe and America, can be fired in 9mm Makarov (.364-caliber) weapons, but accuracy suffers slightly. The 9mm Makarov round, actually 9.2mm (.363-.365in), should *not* be fired in 9mm Police/Ultra pistols though. Both the 9mm Ultra and 9mm Makarov cartridge cases are 9x18mm and are generally identified as 9x18mmUltra and 9x18mmM, respectively. The semi-rimmed .380 ACP (9mm Kurz – .356-caliber – 9x17mm) will chamber in a 9mm Makarov, but should *not* be fired in it.

[111] This weapon was the Soviet Degtyarev-Shpagina DShKM-38/46 heavy machine gun and its Chinese version, the Type 54. The Soviets nicknamed it the *Dushka* (“Sweetie” or “Dear”) and US troops call it the “Dishka” (from the 1990s).

[112] The cartridge is commonly known as the .50 Browning, .50 BMG (Browning Machine Gun), 12.7x99mm (Europe), or 0.5in (UK).

[113] While not used in a homicide or fired during the commission of a crime in the US, there have been just over 30 incidents since 1989 in which .50-caliber rifles were confiscated along with other firearms from individuals involved in criminal activities, but the weapons were not fired or used in a crime.

[114] Barrett Firearms Company now refuses sales or services to California law enforcement agencies as a result of this act.

[115] The licensing fees were paid off before World War I.

[116] A different cartridge than the British pre-World War I .276 Enfield (7x60mm; actually .284-caliber) tested in the P’13 Enfield rifle, from which the .303in P’14 (No. 3 Mk I) and US .30-06 M1917 Enfield rifles evolved.

[117] It has been suggested by many that a modernized .276 Pedersen with redesigned bullets and a modern propellant would be an effective replacement for the comparatively feeble 5.56mm. The 1930s .276 Pedersen matches the performance of the Soviet 7.62x39mm AK assault rifle cartridge.

[118] Browning machine guns would also have been chambered for the .276 Pedersen. The conventional wisdom of the period foresaw there was no need for a squad automatic weapon if the semiautomatic, 10-shot .276-caliber Garand had been adopted and backed by company Browning .276-caliber light machine guns. The BAR would have been withdrawn and there were no plans to replace it with a comparable .276-caliber weapon, which would have been a mistake depriving the squad of its base of fire in the form of a bipod-mounted automatic weapon.

[119] This is a true statement in regards to small, *recently* imbedded splinters in soft tissue, although larger ones near the surface may be detectable. However, after three or so days lesions form making them more easily detectable by X-ray.

[120] *Ersatz* means "substitute" or "replacement" in German, though it has come to mean something shoddy or of poor quality in English parlance.

[121] Sepoy was a Persian term for soldier and referred to native troops serving under the British in India.

[122] German *Zweiten Weltkrieg* small arms ammunition boxes and cartons were not marked with the caliber, only the type of bullet and occasionally the type of weapon it was intended for. For example, 7.9mm rifle and machine gun ball ammunition was marked on cartons as *"Patronen s.S."* (*schweres Spitzgeschoss* – cartridges, heavy pointed bullet), 9mm pistol and machine pistol ammunition as *"Pistolenpatronen 08,"* and 7.9mm *kurz* as "*Pistolenpatronen 43*."

[123] DODAC (pronounced "doe-dac") = Department of Defense Ammunition Code, a number assigned to every model, variant, and form of packaging of ammunition items.

[124] From 1942 the M17 tip color was designated maroon, but redesignated brown in 1952 with no change in the color; it still looks maroon.

[125] Magnesium particle reactions with tissue fluid also may produce magnesium dihydroxide, which results in an alkali chemical burn. Retained magnesium particles in skin may produce a lesion that mimics gas gangrene, with tissue death and intratissue gas bubbles due to hydrogen gas formed from the same reaction. Because of the small amounts involved and because it normally burns up, such occurrences caused by tracers are extremely rare.

[126] The Viet Cong and North Vietnamese Army used captured M16A1 rifles and understood that it was lighter and fired faster (not always an advantage) than their AK-47. Regardless of all the accolades proponents touted of the M16A1, the VC/NVA much preferred the more rugged and reliable AK-47/AKM and its better penetration. They conducted firing demonstrations to show this to their troops.

[127] In passing interest, since 1990 JP-8 fuel (jet propellant – "Jet-A" commercial designation) is used in virtually all US military vehicles, generators, heaters, and helicopters replacing JP-4, diesel, and automotive gasoline ("mogas") fuels.

[128] FM 3-23.30 and its earlier editions contain more incorrect, misleading, and incomplete information than any manual ever published by the US Army. Use this manual with extreme caution. A small book could be written on its errors, deficiencies, and omissions.

5.
THINGS THAT GO BOOM

Just about everyone likes things that blow up, well, at least most of the folks this writer knows. Anyway, there's a lot to be learned about explosive ordnance and it's dangerous stuff in the hands of inexperienced individuals. It's even dangerous to highly skilled and knowledgeable specialists. One should never tamper with or attempt to modify any form of explosive devices or munitions in any manner. Insert your earplugs before proceeding. This chapter covers some of the frequently asked questions about explosives, as well as the basic facts and points of trivia.

When was the MODERN TIME FUSE developed?

Bickford safety fuse was developed in England in 1836 and credited with saving the lives of countless miners. It is characterized by a waterproof or water-resistant outer covering. It contains a black powder or pyrotechnic compound that burns at a uniform rate. The safety fuse is about ¼in (6–7mm) in diameter, sometimes smaller. It has been improved over the years. Prior to the introduction of safety fuse, time fuses consisted of course hemp twine rolled in damp black powder, which later dried. It was far from uniform in its burn rate and it was not waterproof. In earlier days a crude "waterproof" time fuse was fabricated by rolling the fuse in tar, but it too did not have a uniform burn rate and was only partly water-resistant. Different manufacturers' lots, brands, and types of modern time fuse burn at different rates and must always be test-burned and timed before using any given lot. Five or six inches should be cut off the end of safety fuse before burning it as the end may have picked up moisture affecting its burn rate.

When was modern DETCORD developed?

Detonating cord was developed in France in 1902 to connect dynamite charges, first using black powder, then TNT in 1908. It was covered with waterproofed woven fabric and was typically about ¼in (6–7mm) in diameter. **Modern detcord is filled with PETN**, a high-velocity explosive with a ratio of 1.42 compared to TNT's 1.00, and was developed by the Ensign-Bickford Company of Connecticut in 1936. Detcord is now covered with flexible plastic tubing making it even more waterproof.

Detcord is not a delay time fuse; it instantaneously detonates the explosive charges it is connected to. It requires a blasting cap to initiate it.[129] Detonating cord is also known as instantaneous fuse, primacord (UK and US slang), cordex (UK – derived from "cord, explosive"), *Knallzündschnur* (German), and *cordeau détonant fuze* (French). When different explosive charges are linked by detcord the inexperienced sometimes expect the charges to detonate in sequence with a pause between each explosion. They do, but the "pause" is measured in microseconds. For all practical purposes the charges detonate as one big simultaneous bang. Detcord, by the way, makes a good expedient clothesline.

What DEMOLITION CHARGES currently in the US Army and Marine Corps inventory have been IN USE THE LONGEST?

After World War II a number of new demolition charges were standardized making use of improved explosives such as C4, but a few charges, with some slight modifications in their manufacturing process and possibly improved materials, have seen long service. These include the ½lb TNT block standardized in 1940, the 1lb TNT block of 1943, and the 15lb M2A3 and 40lb M3 shaped-charges from 1944. The M1 bangalore torpedo was adopted in 1942 (influenced by British models); the current model is the M1A2.

Where does the term "BANGALORE TORPEDO" come from?

The bangalore torpedo was developed as an expedient barbed-wire breaching explosive charge in 1912 by Major R. L. McClintock of the

Bengal, Bombay, and Madras Sappers and Miners. It was named after Bangalore Arsenal, India where it was tested. The purpose for developing the bangalore torpedo was not as an assault breaching charge, but as **a means of obliterating existing barbed-wire obstacles** left over from the Boer War (1899–1902) and Russo-Japanese War (1904–5). These first bangalore torpedoes were 6ft 6in (2m) long, 2½in (65mm) in diameter, and contained just over 1¾lb (0.79kg) of dynamite per linear foot.

It is called a "torpedo," not because it is used in the water, but because "torpedo" was an old term for an explosive charge enclosed in a case. Command-detonated floating sea mines used during the American Civil War were called "torpedoes," leading to Admiral David G. Farragut's August 5, 1864 order in Mobile Bay, Alabama, "Damn the torpedoes, full speed ahead!"

During World War II all of the major belligerents issued bangalores of similar designs. Armies also locally fabricated expedient bangalore torpedoes from pipe and demolition charges. Today's bangalores are generally between 5 and 6ft (1.5 to 1.8m) in length, about 2in (50mm) or so in diameter, and filled with improved explosives. They have adapters allowing any number to be attached together end-to-end. Besides breaching barbed-wire obstacles they can be used to blast narrow gaps through antipersonnel minefields and for gapping other antipersonnel obstacles including exceedingly dense brush and bamboo.

What is C4?

Today C4 is **the most commonly used explosive** in the US and many other countries' inventories for demolition projects. Composition C4 is a plastic explosive adopted by the US after World War II to replace C3 (the "C" redundantly means "Composition"). C3 was yellowish-brown in color, had a strong odor, generated unsafe fumes in storage, and was sticky to work with. Prior to C3, even more troublesome C2 was used. Similar to C3, it was dangerous to use in combat situations as a bullet hit would detonate it. C2 and C3 could only be exposed to water for less than three hours as it would break down.

In contrast, C4 is white in color, has only a very faint odor, generates no harmful fumes (unless burned), a bullet or fragment hit will not detonate it

(rapid multiple hits may detonate it though), it can be used underwater, and is dry and putty-like in consistency making it easy to work and shape. Plastic explosives are also known as Plasticine or *Plastique* (French, but sometimes informally used by the British). C4 is made of 91 percent RDX, 5.2 percent diethylhexyl (a plasticizer), 2.1 percent polyisobuylene (a rubber-like substance), and 1.6 percent motor oil. It has about the same sensitivity as TNT, but is more powerful with a relative ratio of 1.34 to TNT's 1.00.

So what is RDX, the primary component of C4? **Simple – cyclotrimetylenetrinitramine**. Now we know why the British, who developed RDX during World War II, call it RDX, or Research and Development [Establishment] eXplosive. Today the British call C4, PE4 (Plastic Explosive 4). The original British version was known as Nobel's Explosive No. 808 (aka Nobel's 808). Its development actually began in Germany in 1899, as *Hexogen.* RDX is one of the most powerful conventional explosives ever developed with a relative ratio of 1.60 (TNT is rated 1). It is highly stable and stores well. RDX was used alone as a filler for bombs and other projectiles or as a component of explosives such as Compositions A, B, and C. The idea behind developing C4, besides handling improvements over C3, was to capitalize on the explosive power of RDX. Of course the addition of plasticizing substances reduced its explosive ratio somewhat, but nonetheless C4 provides a very powerful demolition charge.

US C4 production began in 1956 and it is still standard. The standard US C4 charge is the 1.1lb M112 demolition charge. Many comment that its 1.1lb weight makes it awkward to mentally calculate the requirements for large charges. This weight was selected because of NATO standardization. A 1.1lb M112 charge equals 500g and two M112 charges equal 1kg, the common weights of many NATO forces' own C4/PE4 demolition charges.

Can a small ball of C4 be burned to HEAT A CANTEEN CUP of water?

YES. A small piece of C4 may be used for cooking or heating rations, so long as the safety constraints are followed. It was a common practice in Vietnam. A piece of C4 is rolled into a ball about the diameter of a nickel

(approximately 20mm in diameter) and a small tit pinched on its side. It is placed in a small, shallow can (a tuna fish can is ideal since C-rations cans are no longer available). Slits are cut in the lower portion of the can's side with a knife or bayonet for ventilation and two small green sticks laid across the can's open top. The tit is lit with a match or lighter and a canteen cup of water or *opened* can of food is placed on the sticks (leave the can's lid attached as a handle). It will boil in just a few minutes. To extinguish the ball of C4 the can is tipped over on to bare ground and the ball is doused with water or rolled in the dirt with a stick until smothered. The unburned C4 may be reused and stowed in a plastic bag even with dirt stuck to it, once it cools.

It is important to remain clear of the burning C4's smoke and fumes; they are extremely harmful to breath. Do not allow particles of C4 to come in contact with food, although C4 has a comparatively low toxicity, it is harmful if enough is swallowed. Do *not* stomp on the burning C4 to extinguish it. It is reported that it will explode, although this is questioned by explosive experts – but I do not recommend trying it. A large amount of C4 if burned will also be ignited (explode) by the intense heat. C4 should not be left lying in the open as animals and children will eat it (it tastes sweet) and it will kill them within minutes if enough is consumed or make them extremely ill if small amounts are eaten. There are reports of soldiers eating a tiny amount of C4 to cause vomiting in order to be evacuated from the field, an exceedingly dangerous practice.

A problem encountered in Vietnam was that Vietnamese troops would crack open M18A1 Claymore antipersonnel mines and remove the C4 to divvy up with buddies and use it for cooking. This of course wasted the mine and they sometimes stole the explosives in mines that had been emplaced around firebase and other installation perimeters, an act welcomed by enemy sappers.

TNT and dynamite can be burned as well in small quantities without exploding, but neither is recommended for cooking or incendiary purposes, nor is it recommended to burn them or any other explosive just to see what happens. If burned in large quantities or in confining containers they will explode. They can be difficult to extinguish and they throw sparks that can injure or ignite fires. They also produce harmful fumes if burned or detonated in an enclosed area.

Occasionally one hears mention of “C5” plastic explosive. This is usually related in a story about using a small ball of C5 to heat a canteen cup of water. It was earnestly warned that C5 flames are so hot that it would burn like a blowtorch through the aluminum cup. There is no such thing as C5.

What is SEMTEX?

Semtex is much talked about as the terrorist’s explosive of choice and is very similar to C4. Semtex-H, the most common, consists of 40.9 percent PETN and 41.2 percent RDX while Semtex-1A is 76 percent PETN and 4.6 percent RDX. (The rest is binders and plasticizers.) Semtex-H is reddish brown to red and Semtex-1A is red-orange to yellow. The are odorless plastic explosives formerly manufactured in Czechoslovakia from 1966 by Semtin Glassworks (now *VCHZ Synthesia*). Since it is easily moldable and odorless, making it impossible for humans or dogs to detect, it is much sought after by terrorist groups as it can easily be secreted on to aircraft or smuggled through security. Czechoslovakia sold Semtex to Iran, Iraq, Libya, Syria, Cambodia, and other notorious states. Besides all the hoopla about Czechoslovakia and Semtex, it is or has been made in China, India, Iran, and North Korea, and it is unlikely that it is odorized. Only about 1lb (500g) of Semtex-H is believed to have been used to down the PamAm Boeing 747 over Lockerbie, Scotland in 1988 killing a total of 270 people, in the aircraft and on the ground.

It is odorless because of the binders and plasticizers used but in 1991, Czechoslovakia bowed to world pressure and began to manufacture Semtex with ethylene glycol dinitrate (EGDN) to give it a distinct disagreeable odor and it is now bright red-orange in color. It is thought that few stocks of odorless Semtex remain in circulation although it can be safely stored for a prolonged period under favorable conditions. Two small Semtex-H bombs were discovered in Northern Ireland in late 2000, so it may still be encountered. It is possible that Semtex or some similar odorless explosive may now be manufactured by one or more rogue states.

Why is WHITE PHOSPHORUS called “Willie Peter” and what is it?

White phosphorus has been called “Willie Peter” or “Willie Pete” in US military slang since World War II. It is derived from the World War II phonetic alphabet words for “W” and “P” – Willie being derived from WILLIAM, and PETER.[130] In Commonwealth countries it is called “White Phos.”

WP is the densest and most vivid of the white smoke compounds. Its TOP value[131] is 3,500. Hexachlorethane-zinc (HC) white smoke compound used in the US AN-M8 smoke hand grenade has a TOP value of 2,000. (See “Does the new US white smoke hand grenade replace the old model?” above.) Unlike other smoke compounds, WP (P_4) is a casuality-producing agent. It is a soft, wax-like yellow compound that ignites when it comes in contact with air at temperature of over 86°F (30°C) or by a bursting charge. Upon ignition it burns with an intense 5,000°F (2,760°C) yellow-white flame immediately producing dense white smoke. WP grenades and projectiles contain a small bursting charge to rupture the casing and scatter the burning WP. WP in itself is not explosive. It has a putrid garlic-like odor and is non-toxic when the smoke is inhaled, but WP particles will poison food and water if they come in direct contract. Besides screening and target marking, WP is used to ignite fires and is effective against personnel and materiel. Accidents sometimes occurred when individuals thought bursting-type WP smoke grenades were burning-type smoke grenades. Red phosphorus (RP) is also used for smoke screening. While it is dark red in color, when ignited it still burns with a white smoke. It requires a bursting charge to ignite it. It will not ignite when exposed to air below 464°F (240°C) making it safer to transport. During World War II WP was mainly used by the US, Britain, and Japan. Germany lacked the capability to produce it and used titanium tetrachloride (FM), HC, and Berger compounds instead.

What was the first US weapon to use a SHAPED-CHARGE WARHEAD?

It was the **M9 antitank rifle grenade**, which the US copied, sort of, from the German GG/P40 rifle grenade, also Germany’s first use of the shaped-charge in a projectile. Coincidentally, the antitank rifle grenade was the first use of the shaped-charge, or hollow-charge, effect by Britain, the Soviet

Union, and Japan as well. Adopted on December 30, 1940, the US M9 proved to be only marginally effective against tanks and bunkers as there was no ogive (streamlined nose cone) to provide the necessary standoff ensuring a maximum shaped-charge effect. The location of the fuse in the nose further interfered with the effect. Its fuse was unreliable and required at least a 20-degree angle of impact to function. It was withdrawn in 1942, before it was used in combat, and replaced by the M9A1 with a base detonating fuse and an ogive to provide standoff. M9s were provided to the British after Dunkirk, but were not used in action; it was better than nothing. The German GG/P40 grenade had a more effective base detonating fuse, but the Germans too discovered the standoff problem and also withdrew the grenade from use in 1942 replacing it with an entirely different type.

When was the shaped-charge FIRST USED IN COMBAT?

Glider-landed German paratroopers of Assault Group "Granite" (1st Company, Parachute Infantry Regiment 1 and the Parachute Pioneer Platoon) led by Captain Walter Koch (1910–43), destroyed armored gun turrets and gun embrasures in concrete casemates atop the Belgium National Redoubt at Eben-Emael (*Fort d'Ében-Émael*).[132] The fortress was armed with 34 antitank guns and artillery pieces plus 25 twin machine guns and some antiaircraft guns. The assault on May 10, 1940 was also the first use of gliders to deliver troops into combat. In half an hour 61 *Fallschirmjägern* delivered in nine gliders defeated a massive, heavily armed fortress defended by 650 troops with the loss of six attackers killed and 18 wounded. The Germans were unable to penetrate the fort's interior, but they neutralized its armament and the garrison surrendered the next day.

They employed hand-emplaced 12.5kg (27.5lb) and 50kg (110.2lb) hollow-charges (*Abstandsladung*). They used smoke candles to blind firing ports plus welded a single flamethrower. The 50kg charge could be carried in two sections to make it more manageable to move by hand and emplace. It could be dropped in a separate parachute container with a small two-wheel cart to move it to the target.

How does a SHAPED-CHARGE really work?

The shaped-charge, or hollow-charge, high-explosive antitank (HEAT) warhead was widely used in World War II as a means to penetrate armor. It was used in hand and rifle grenades, antitank and tank guns, antitank rocket launchers, recoilless guns, light field artillery, antiaircraft guns (against ground targets), and hand-emplaced demolition charges. Shaped-charge munitions rely on a principle known as the "Monroe effect," named after its American inventor, Charles E. Monroe, a professor at the US Naval Academy in 1888. Monroe did not prefect it as an armor-penetrating charge; he simply demonstrated its effect. The principle employs an explosive charge with a cone-shaped cavity. The cavity placed against the target focuses the blast on a small point and cuts a hole through metal. Early shaped-charges had a comparatively shallow cavity. During World War I a German, Egon Neumann, improved the concept by lining the cavity with thin metal and detonating the charge, not directly against the metal surface, but a short distance from it to further focus the blast; two to three times the diameter of the charge. He failed to prefect it for military use, however.

An Austrian, Franz R. Thomanek, was the first to develop a useable cone liner, which greatly enhanced penetration. In 1935–38, a Swiss chemical engineer and former Swiss Army machine gunner, Henri H. Mohaupt, perfected the principle and demonstrated its use in demolition charges. In October 1941 he came to the US and worked on the bazooka project for the Ordnance Department. On seeing Mohaupt's pre-war demonstrations, a British ordnance engineer (name unknown) ascertained the concept and designed the first grenade with an, albeit crude, shaped-charge warhead, the No. 68 antitank rifle grenade.

One of the main benefits of shaped-charge projectiles is that they do not rely on velocity or mass to penetrate armor. A shaped-charge round will achieve the same penetration at 500m range, as it will at 50m. It makes no difference if the projectile is hand-thrown or fired from a high-velocity gun. While the two entirely different types of projectiles would by necessity be of different designs, if they could theologically be of the same size with the same amount of and type of explosive and the shaped-charge's cavity were the same, the penetration would be identical. The projectile is comparatively light and inexpensive as no hardened steel penetrators or extensive casting or machining is required. Armor two to three times the

diameter of the cone can be penetrated. Upon impact on the target the projectile is detonated by a base detonating fuse; the metal lining, usually copper, is transformed into a molten “hot solid slug” which punches through armor plate at approximately 33,000ft/sec (10,000m/sec). Penetration is achieved by means of a jet of hypervelocity ductile metal.

This process is usually described as the liner being “vaporized into a plasma jet that instantly burns through armor.” This is not entirely correct. This “slug” of molten metal (mainly the copper lining cone) carries with it fragments from both the projectile and the armor itself. It is not “plasma” and it does not “burn” though armor. It punches a hole through it. The hot slug and fragments will ignite ammunition and fuel and kill anyone in their path. Eventually the slug breaks up into smaller particles and little further penetration occurs. The hole created is surprisingly small in diameter and the outer entry hole is larger in diameter than the interior exit hole. Besides penetrating armor, shaped-charges penetrate any hard surface such as concrete, masonry, timber, or sandbags.

Shaped-charges also create secondary fragmentation that will injure personnel outside the target. A shaped-charge projectile striking the ground among troops in the open will cause casualties. Much of the blast will be directed into the ground, but significant blast, the fragmenting body, and secondary fragmentation is still deadly.

Fin-stabilized shaped-charges have more effective penetration than spin-stabilized projectiles. Fin-stabilized projectiles do not rotate or rotate at a very low rate. The high rate of spin imparted on spin-stabilized projectiles (achieved by rifling) dissipates up to three-quarters of the penetrating effect through centrifugal force. This results in a broader and shallower blast effect.

Shaped-charge warheads can be defeated, or their effects greatly reduced, by placing heavy wire mesh or thin steel plates a short distance (“standoff”) from the armor plate. This causes the shaped-charge to detonate short of the target and dissipates the effects of the penetrating slug resulting in little or no penetration. More sophisticated means of defeating or reducing the effects of shaped-charges include explosive reactive armor (ERA), composite armor, ceramic armor, bar or slat armor, and, undergoing development, “electronic armor.”

Who invented the "MOUSE-HOLING CHARGE"?

A mouse-hole charge is a wooden framework, perhaps 2x3 feet, with a small demolition charge on each corner and one in the center. The charges are connected by detonating cord so they will detonate simultaneously. The framework is set against a wall to blast a man-size hole through it. Often attributed to the British, who used it extensively and passed the idea along to the US, it was actually invented by Canadians. A rapid method was found necessary during the December 20–27, 1943 battle of Ortona to gain entry into buildings and between rooms. This vicious MOUT fight, among Canada's most costly battles, occurred in the Italian Adriatic coastal town of Ortona and has been described as the "Little Stalingrad." Troops of The Loyal Edmonton Regiment and The Seaforth Highlanders of Canada, 2nd Infantry Brigade, 1st Canadian Infantry Division quickly developed the expedient method as a means of blasting crawl-holes between rooms and abutted buildings to allow them access and avoid the machine gun-swept streets and doors and windows targeted by snipers. Acting Lieutenant-Colonel Sydney W. Thomson (1914– 2008), battalion commander of The Seaforth Highlanders of Canada, is specifically credited with the idea. No doubt explosive charges had been used previously to knock holes through walls, but this was the first known field expedient-made charge for the purpose. The Germans and Soviets used regular demolition charges in Stalingrad and other cities to blast openings through the walls of buildings, but not using the framework assembly the Canadians devised.

The media has recently reported that the mouse-holing charge was invented by the Israelis who used it in Gaza and that the US Army found out about it when studying Israeli MOUT techniques for use in Iraq. However, the technique has long been known and addressed in US demolitions and military operation on urbanized terrain manuals since World War II.

What was the "STICKY BOMB?"

This diabolically conceived evil device was the **British No. 74 Mk 2 antitank hand grenade**. Known as the "ST grenade" (sticky-type) or "sticky bomb," it was none too popular. It had the unpleasant propensity of

sticking to the uniforms of careless bomb throwers, much to their shortlived vexation. It was developed in early 1940 as a sabotage weapon by the War Office's Directorate of Military Intelligence's MD1 organization.[133] The 2.25lb "ST" was offered to the British Army, but considered too dangerous. Out of desperation for antitank weapons after Dunkirk they were soon issued to Home Guard and Army units. The "ST" consisted of a two-piece, hinged, stamped steel 4.5in sphere. Inside was a stockinet (stockinette in British spelling) stretch cloth-covered spherical Bakelite flask filled with 20oz of Nobel's 823 (nitrocellulose and nitroglycerin). A small air space was left in the flask to allow the ball of explosive to expand slightly in hot weather. A retaining clip or pin held the cover to the flask's neck. The stockinet cover was thickly coated with especially sticky lime glue made from bird poop … this grenade just gets better and better.

Two pointed rubber projections in each half of the cover kept the sticky covering from coming into contact with the inside of the cover. The flask had a screw-on collar in which the handle-like delay fuse was fitted. This also held the detonator (primer cap, delay fuse, and composition exploding pellet) inside the flask. To use it, a cover retaining pin, inserted in the cover near the handle, was pulled and the hemispheres opened and fell off when the grenade was held downward. This was not the safety pin in the handle with the safety warning tag. This pin was then pulled while the arming lever was held against the handle. A warning tag was attached to the safety pin, "DANGER DO NOT REMOVE THIS PIN UNTIL READY TO THROW GRENADE." The grenade was thrown at which time the arming lever flew off the handle and ignited the five-second delay fuse. The grenade stuck to the side of the tank, or anything else such as the bomb thrower's wool uniform, and detonated after five seconds. It would not stick to a vertical or sloping surface that was wet, muddy, or oily. It could be thrown about 20 yards or hand-emplaced on a firing port shutter or pillbox door to unhinge it. If hand-emplaced it was to be smashed against the target with sufficient enough force to break the flask and the soldier had to withdraw at least 10 yards before it detonated after only a five-second delay (another reason for its unpopularity). It relied solely on blast effect to penetrate or spall (fragment) the interior armor. The "ST" saw little action with the British, but it was provided to the French Resistance in some instances. It performed very poorly in Australian hands in New Guinea as the glue deteriorated in the tropics and quickly lost its stickiness. It was withdrawn

from service in 1943 due to deteriorating nitroglycerin and the glue drying out in storage.

During World War II the US Army's Tank Destroyer School at Camp Hood, Texas developed an expedient "sticky grenade" of questionable effectiveness. It consisted of a GI sock filled with at least 2lb of TNT, a 30-second delay fuse, and No. 8 detonator with a throwing stick inserted or a web throwing sling attached. It was dipped in a bucket of tar or covered with heavy axial grease and slapped on to or thrown at a tank to which it was hoped it would cling; not likely on a hot day, nor was it likely to have been used in combat, the motion picture *Saving Private Ryan* (1998) in which it was depicted notwithstanding.

The Germans also had a crude sticky grenade they developed late in the war using the warhead of an antitank rifle grenade and adhered by a beeswax-impregnated felt pad. Mostly the Germans relied on magnetic shaped-charge "hand-mines," which were fairly effective and much feared by the Soviets. It took a gutsy soldier to deliver it and the Germans established a special award which was bestowed on survivors successfully using them and other close-range antitank weapons, the *Sonderabzeichen für das niederkämpfen von Panzerkampfwagen durch Einzelkämfer* (Special Badge for the Close Combat of a Tank by Single Combat).

Where did the nickname "BOUNCING BETTY" for bounding-type antipersonnel mines come from?

A 10-man squad could dash across a typically dispersed pressure-activated antipersonnel minefield and easily avoid casualties or suffer one or two in the worst case. It was a different matter with the "bouncing Betty," arguably the most feared landmine of World War II. The small mine was buried with only the fuse exposed and connected to a horizontal tripwire, especially difficult to detect among brush and grass or at night. "Bouncing Betty" was the nickname originally applied to the World War II German *Schrapnellminen 35* and *44* bounding-type antipersonnel mines, called "S-mines" by the Allies. *Schrapnellmine* means "shrapnel mine," but is sometimes reported as a *Schützenmine* – [anti]infantry mine,[134] which is a different type of mine. The "S-mine" was dubbed by war correspondents as the "jumping Jack," "bouncing baby" or "bouncing Betty," but the troops

called it the "bouncing bitch." Troops also called it the "castrator" as it detonated 4–10ft above ground spraying out 360 steel ball bearings. The British Tommy nicknamed it the "deballocker" for obvious reasons. The French, who first experienced it, called it the *soldat silencieux* (silent soldier) as it remained hidden and silent until detonated, which also alerted defenders of the enemy's approach through woods and brush. The Germans sometimes referred to it as a *Springmine* or *Splittermine* (spring-mine or splinter-mine), of which they produced almost two million.

"Bouncing Betty" now refers to any bounding-type antipersonnel mine. Many countries, including the US and UK, adopted similar bounding-type mines during the course of the war. (See "What kind of landmine does not detonate when stepped on, but explodes when the foot is lifted off?")

Did the UNITED STATES COPY any GERMAN World War II ordnance?

Yes, two mines, a rifle grenade, an aerial bomblet, and to some degree, an antitank/tank gun. We will now consider these in more detail:

- The US post-war **M16 antipersonnel mine** was copied from the above *Schrapnellmine 44 (S.Mi.44),* the "bouncing Betty," to include its fuse as the US M605 based on the German *S.Mi.Z.35* fuse. The M16 replaced the US M2-series antipersonnel mine, which too was influenced by the German "bouncing Betty" in concept, but was not as effective and the German design was turned to.
- The other mine, the **M15 antitank mine**, was copied from the *Tellermine 44 (T.Mi.44),* a heavy antitank mine, or what the Allies called a "T-mine." *Tellermine* means "platter mine." It is often reported to mean "mushroom mine," owing to the mine's shape, but "mushroom" is *Pelz.* It has also been reported, or assumed, that "Teller" referred to the mine's designer. Both of the M15 and M16-series mines are still in the inventory, although the use of landmines is now prohibited.
- Another weapon was the **M9 antitank rifle grenade**, which the US copied, sort of, from the German *Gewehrgranate zur Panzerbekämpfung 40* (rifle grenade for antiarmor combat - *GG/P40).*

This was both Germany's and America's first use of the shaped-charge in a projectile. By the way, the antitank rifle grenade was the first use of the shaped-charge effect by Britain, the Soviet Union, and Japan as well. Standardized on December 30, 1940. The US M9 is described above under "What was the first US weapon to use a shaped-charge." It was withdrawn in 1942, before it was used in combat, and replaced by the M9A1 with a base detonating fuse and a rounded nose ogive to provide standoff. (The M9 had also been provided to the British Home Guard in the desperate days of 1941, along with US rifles and grenade launchers, which was better than nothing.) The German GG/P40 grenade had a more effective base detonating fuse, but the Germans too discovered the standoff problem and withdrew the grenade in 1942 replacing it with an entirely different type. The M9A1 was used through the Korean War.

- The Germans developed a small antipersonnel cluster bomblet (6, 23, or 108 delivered in a cluster bomb casing) known as the "butterfly bomb" (*Schmetterling Bombe*), the *Sprengbombe Dickwandig 2kg* (*SD2)* (high-explosive bomb, thick-walled); aka "popcorn bomb" owing to the crackling sound of their rapid succession detonations. The US copied it closely as the **M83 antipersonnel bomblet** and used it into at least the 1960s. The "butterfly bomb" nickname is owed to the two halves of the cylindrical body and the ends, which opened as it descended to provide stabilization and made it appear to flutter to the ground. They were painted green (some all yellow), sometimes with yellow and red coding stripes making them appear even more like butterflies.
- It is often said that the German *Rheinmetall 3.7cm Pak.35/36 Panzerabwehrkanone* was copied by the US as the **37mm M3A1 antitank gun** standardized in 1940 (the limited production M3 in 1938) and produced until 1943. Initially hypted as the "stinger" owing to it high velocity, it remained in use through the war and began to be replaced by the 57mm M1 antitank gun in 1943 (itself a copy of the British 6-pounder Mk II). The 37mm and 57mm were replaced after the war by the 75mm M20 recoilless rifle. Actually, while the M3A1 was heavily based on the German model, it was greatly modified and had a much different breech system, carriage, and other components. Variants of the US gun, called a "popgun" owing to its marginal

performance, included the 37mm M5 and M6 mounted in light tanks, both derivatives of the M3. This most numerously produced German antitank gun, the Pak.35/36, was also used by Italy, Hungary, and China. Some of these Chinese guns, purchased before the war, were captured by the Japanese, shipped to the Philippines after the islands fell, test fired against captured US M3 Stewart light tanks, and then used against the US troops on Guadalcanal in 1942. The Germans called the impotant little gun the *Türklopfer* (doorknocker).

FACT:
While not a weapon as such, the US did attempt to copy a machine gun employment concept used by the Germans. They had been using MG.34 and MG.42 machine guns in both light and heavy roles. The former being used at squad-level and fired from a bipod; the latter was used at battalion-level for long-range support and added a recoil-absorbing tripod and optical sight. US rifle companies were equipped with tripod-mounted .30-caliber M1919A4 light machine guns, which proved marginal for both light close-combat and heavy long-range support roles. The water-cooled .30-caliber M1917A1 was used more effectively in the latter role. In an effort to improve the Browning M1919A4 as a more flexible light machine gun it was provided with a lighter barrel, flash suppressor, carrying handle, and detachable shoulder stock. The resulting M1919A6 was actually heavier than the M19191A4 without its tripod. The M1919A6 could still be mounted on the M2 tripod as a support machine gun. It was too heavy though and did not fulfill its promise as a light machine gun.

Did the UNITED STATES COPY any JAPANESE World War II ordnance?

No. That said the US did experiment with a much modified version of the 5cm Taosho Type 10 (1921) grenade discharger, the early “knee mortar.” The T7 platoon mortar was an unusual test weapon copied from a “knee mortar” captured on Guadalcanal. The American version had a 60mm barrel

rather than 50mm to accommodate the standard Mk II fragmentation "pineapple" hand grenade (2.3in diameter). The grenades were modified with an adapter on the bottom, replacing the threaded filler hole plug, to house a propellant cartridge. The goal was to provide the rifle platoon with a lightweight mortar using issue hand grenades as ammunition to fill the range gap between hand grenades and conventional 60mm company mortars.

Tested in January 1943, it had a range of 250yd. The T7 project was halted in March as new models of rifle grenades were being fielded and the new 2.36in M1 bazooka rocket launcher was found to be well suited for defeating pillboxes.

The Japanese "knee mortar" did influence US weapons design in that other 60mm mortars were tested to provide a weapon with similar capabilities (lightweight, rapid, indirect, antipersonnel fire). This was a handheld (lacking a bipod) 60mm T18E6 mortar and they saw some use on Okinawa late in the war. It eventually resulted in the 60mm M19 mortar, which replaced the M2 after the war. The M19 had a trigger firing device rather than just drop-fire and could be fired from a bipod or handheld. Indirectly the "knee mortar" influenced the development of the 40mm M79 grenade launcher in the mid-1950s.

The Japanese themselves did make copies of a couple of US weapons. Just prior to the war the Imperial Japanese Army began building a copy of the 12.7mm (.50-caliber) Browning M1921 aircraft machine gun, the Type 1 (1941) or Ho-103 (fixed) and Ho-104 (flexible). It did not fire the standard US 12.7x99mm cartridge though, but a shorter 12.7x81mmSR based on a British Vickers round.

The Imperial Japanese Navy built 20 7.7mm Type 5 (1945) rifles for trials with its Special Naval Landing Force (*Tokubetsu Rikusentai*).[135] It was a close copy of the .30-caliber Garand M1 rifle. The major difference was that the Type 1 was loaded with two five-round charger clips rather than the Garand's eight-round *en bloc* clip. They did not function as well as the M1 owing to poor quality materials, inadequate reverse engineering of the design, and incorrect design readjustment to accept the shorter 7.7mm cartridge.

The US needed a stronger disintegrating metallic-linked belt to handle the stresses caused by new high rate of fire machine guns, namely the .50-caliber AN-M3 used in post-war jet fighters. The Japanese 12.7mm Ho-103

machine gun belt link was copied by the US in the early 1950s as the M9 to replace the M2 link and is still in use.

Did the Soviets really use DOG-BORNE BOMBS to attack German tanks?

Yes, for a short time. The Red Army fielded dog-borne antitank demolition charges early in the war. They are described in detail in a German manual dated January 1, 1942; the Germans invaded on June 22, 1941. German staffs at first thought the reports of exploding antitank dogs were a gag or myth perpetuated by soldiers.

What was called a dog mine (*Hundemine*) or a tank dog (*Tankhund* or *Panzerhund*) was an inhumane and rather impractical effort to train dogs to run beneath German tanks to trigger a demolition charge where the belly armor was relatively thin. The dogs were trained in a 40-day program first by placing food beneath full-tracked tractors which were eventually replaced by tanks. Some state that the training took place with static tanks and a loudly rumbling, moving tank was said to frighten off dogs as did machine gun fire even without hitting them. Nevertheless, the Soviets claim they trained with moving tractors and tanks. They also accustomed the dogs to battlefield noises using firecrackers and blank ammunition. In theory, once in the field the dogs would be starved and when *Panzers* appeared they would be released to dart beneath them in expectation of finding food and ended their career with a bang as the backpack charge was triggered. They were organized into “destroyer detachments” of 235 rifle-armed men and with a like number of dogs. Two detachments comprised a 500-man battalion, which were under army-level control.[136] German Shepherds, Dobermans, and other breeds were used.

The Soviets claimed some 300 German tanks were destroyed by antitank dog detachments; at Stalingrad alone it was reported that 63 tanks and two armored cars were destroyed. They may have been more effective in built-up areas as they could dart out at tanks being released at close range from within the rubble. The claim of 300 tanks killed is probably an extreme exaggeration and no accurate figures exist nor were they probably able to be compiled considering the chaotic conditions in the first months of Operation *Barbarossa*.

Several problems were encountered with the use of these dogs, however it should be noted that the truth behind some of these claims cannot be verified. One report claims that having been trained to run beneath Soviet tanks, the dogs tended to return to Soviet tanks rather than run under the strange German tanks. Another reason given for turning tail is that German tanks were gasoline-fueled and the Soviet tanks used diesel; the dogs headed for the familiar smell. It was also claimed that Germans drove off the dogs with machine gun fire and, having been turned back, they hid beneath Soviet tanks. It is questionable whether the Soviets would actually employ their own tanks in the immediate vicinity when releasing uncontrollable tank dogs.

Regardless of the use of firecrackers and blanks in training it is reported that the dogs were run off by rifle and machine gun fire. The Germans encountered problems turning tank machine guns on running, bounding dogs. Most German tanks lacked turret top machine guns, but even these were too slow to traverse. The coaxial machine gun was impossibly slow to traverse and depress. The bow machine gun was not much better. It did not take long for the rushing dog to close in below the machine guns' maximum depression, if it chose to do so. Accompanying German infantry were instructed to fire at any dog, but again a fast moving, bounding, relatively small target is very difficult to hit with bolt-action rifles. Even before the appearance of tank dogs German soldiers had been instructed to shoot any dog they encountered owing to the fear of rabies, which was widespread in the USSR. There are reports that the Germans occasionally used flamethrowers to ward off dogs, but this is unconfirmed.

Another likely, but never mentioned, problem is that the lever-type trigger atop the demolition charge could be activated by the dog running through brush, vines, barbed wire, and other low obstructions to prematurely detonate the charge.

The demolition charge consisted of a strap-on canvas vest with a pack on both sides, each containing a 13.2lb (6kg) demolition charge. The triggering device was a 20cm (8in) spring-loaded lever fitted atop the vest over the shoulders. When tripped it detonated a 200g (7oz) charge, which was connected to the 13.2lb charges by detonating cord – a total of 26.6lb of explosives. An arming pin had to be pulled from the trip lever immediately prior to releasing the dogs.

Antitank dog detachments were withdrawn from use in October 1943.

Regardless of their impracticality they were still addressed in post-war US intelligence manuals for many years … just in case. In 2006 an Iraqi terrorist group claimed to have used a dog to deliver a remote-controlled improvised explosive device (IED) to attack American troops, but this has not been confirmed.

When were the first HAND GRENADES used?

It should be noted that virtually every reference book consulted states a different date and location that grenades were first used. The earliest known use of grenades that the author has been able to locate was in **1427 at the siege of Casalmaggiore** in today's northern Italy. The defenders filled glass bottles with gunpowder, attached a wick in the mouth, and threw them down on attackers from the city walls. By the 1500s grenades had become part of the soldier's armament all through Europe. By then grenades were cast iron spheres about 3in or larger in diameter with a time fuse fitted, just like cartoon spies carry. This was to be the standard design for the next 300 years. By the mid-1700s grenades were considered somewhat obsolete, but were still in use into the early 1800s. The first mechanically fused grenades appeared during the American Civil War, but again soon fell from use owing to the cost, complicity, and poor safety record. The Russo-Japanese War of 1904–5 saw a re-emergence of grenades and their use became extremely widespread in World War I trench warfare. They have since remained an important part of the infantryman's armament – his "pocket artillery."

WHICH CAN BE THROWN FURTHER, a stick grenade or a normal hand grenade?

Besides spherical, oval (egg-shaped), and cylindrical-shaped hand grenades, there is a sub-class of grenades, the stick grenade, or "potato-masher." These usually have a cylindrical body, or head, and are fitted with a handle, usually wooden, by which they are thrown, and the fuse is normally housed in the handle.

There are arguments that a stick grenade can be thrown further or more accurately than a normal grenade. An informal test was recently conducted using three NCOs. Each threw an inert German World War II Stg.24 stick hand grenade (*Stielhandgranate 1924*) (21.67oz) and an inert American World War II Mk 2 "pineapple" fragmentation grenade (21oz) as far as they could. **In all cases they were able to throw the stick grenade a few meters further.** It was also found that the stick grenade would often bounce further than the pineapple to travel still further downrange. The stick grenade was more accurately thrown at shorter ranges, such as through a window. As with normal grenades, range and accuracy depend largely on the individual. One problem with stick grenades is that they have an increased chance of hanging up in or being deflected by vegetation in forest fighting than conventional grenades. Stick grenades are more costly to manufacture, require more materials and production time, and their shipping containers are larger (or require more, smaller containers to ship the same number as normal grenades). All of these are logistics considerations, but then logistics is one of the defining principles of warfare.

What was the most COMPLEX HAND GRENADE to operate?

Most grenades are relatively simple to operate, which is a good thing when you give a hand-launched, high-explosive weapon to an infantryman. He has a lot of things he has to pay close attention too in combat and a simple to operate grenade is essential. Most grenades are operated by simply pulling a safety pin and throwing it to allow the arming lever to fly off, or pulling a cord to activate a friction igniter, or pulling out the safety clip and slapping the percussion igniter on a solid object. All of these actions activate a typically 4–5-second delay fuse (it varies between countries and even between models of grenade in some cases). The pre-World War II Red Army of Workers and Peasants found this far too simple and practical and developed the RGD-33 Dyakonov hand grenade (*Ruchnaya Granata Dyakonova-33*). This stick grenade was adopted in 1933 as both an offensive and defensive grenade. It was provided with a segmented add-on fragmentation sleeve scored in a diamond pattern for the latter role. A small stud on the body engaged a spring lock on the sleeve and held it in place.

To employ the RGD-33 the arming pin was pulled, the spring-loaded metal telescoping handle was pulled back from the head, while gripping the head in the other hand, to cock the firing pin, then twisted half a turn to the right to lock the pin, the handle was then allowed to pop back forward, and then a safety slide was slid to the left before throwing it. All that and it required two hands to operate it. This was a lot to ask of an under-educated peasant soldier during the stress of close combat. Its complexity, along with its cost and production time, resulted in it falling from use early in the war, although it appears to have remained in use with the naval infantry well into the war. At least an enemy soldier untrained on the procedure might have difficulty using captured grenades against their former owners. The Germans, by the way, did use captured RGD-33s, but they had to be trained on them first.

Did the US use "MINI-GRENADES" in Vietnam?

MACV-SOG reconnaissance teams and SEAL teams did in fact use what were called **"mini-frags"** in Vietnam from early 1969. This was the Dutch-made V40 fragmentation hand grenade produced by *Nederlandse Wapen en Munitiefabriek* (NWM). No US designation was assigned, these being special procurement munitions. This little spherical grenade was 1.5in (4cm) in diameter (smaller than a golf ball, the arming pin ring was almost as large in diameter as the grenade), 2.5in (6.5cm) high with fuse, and weighed 4.8oz (136g). It had 326 internal pre-scored fragments and a four-second delay. The casualty radius was up to 18 meters. It is sometimes stated that the "mini-frags" were based on the spherical explosive charge used in 40mm HE grenade launcher projectiles. This is not true; it was a purpose-designed grenade.

FACT:
Another type of mini-grenade was used by US forces in Vietnam, these were the XM166 white, XM167 green, XM168 red, and XM169 yellow "mini-smoke grenades" or "survival smokes." They consisted of a small aluminum can with a screw-on top similar in size and appearance to a pre-digital 35mm camera film container. They were

activated by a scratch-type internal friction igniter enclosed in the cap. This was a cardboard ring with friction material on one side. “Mini-smokes” only provided a small amount of smoke for a shorter duration compared to beer can-sized M18 colored smoke grenades, but they were ideal for reconnaissance teams, which carried them in pockets and handy pouches. While never standardized, these “mini-smokes” were extensively used to mark team locations and pick-up zones for aircraft.

These “mini-frags” were issued in bandoliers of five. They were ideal for small teams needing to break contact with superior enemy forces as a large number could be carried in pockets and pouches. They could be thrown a considerable distance compared to standard grenades. Canadian Forces also used the V40, at least into the 1980s. Earlier, there had been other small hand grenades, but the V40 holds the record for diminutive grenades.

The runner up among mini-grenades was the Yugoslavian Mod. 17 defensive hand grenade (*Obramben Bomba Rucna Mod. 17*). This unusually small, for the World War II period, lemon-shaped grenade was 3.19in (81mm) high (with fuse) and 1.93in (49mm) in diameter.

What is meant by CASUALTY RADIUS?

The casualty-producing effects of grenades and other high-explosive munitions are described by the term “casualty radius.” It is a factor subject to much variance and usually errs on the optimistic side. Casualty radius is usually defined as a radius in meters from the point of detonation in which at least 50 percent of standing personnel are killed or incapacitated.

The criteria of how many and what sizes of fragments penetrate plywood, cardboard, or other material silhouettes varies greatly. It also does not take into consideration if the ground is hard or soft. At least a quarter of a grenade’s fragments are absorbed into the ground and others go straight up. Mud or snow can “smother” much of a grenade’s effects. Even light underbrush can reduce the effects of grenade blast and fragmentation; dense underbrush and bamboo reduce blast effects even more. Of course, when it is stated that a grenade’s casualty radius is 15 meters that does not mean

there are no casualties outside that radius. There would be, just fewer in number and sometimes of less severity. Many such tests were conducted with the grenade suspended off the ground, an attitude in which it would seldom detonate. A grenade bursting over the heads of troops or at torso-level would cause more casualties in a wider radius than one on the ground. Keep in mind that grenade tests were normally conducted under ideal conditions in a controlled environment. Results in the field usually do not duplicate test center statistics.

Regardless of the stated casualty radius, fragments will travel up to 200 meters in some instances. Secondary fragmentation (gravel, rocks, wood splinters, glass, etc.) propelled by the grenade's blast also cause injuries.

Grenade fragmentation is at best irregular. Fragmentation and blast effects are seldom consistent on a 360-degree radius. An individual standing 1 meter from an exploding grenade may suffer no more than being knocked off balance while another individual 4 meters away can be shredded. Most modern grenades ensure it is almost certain that personnel within 5 meters will become casualties.

To demonstrate the erratic behavior of grenade fragments the author offers an example of an incident he witnessed. An NCO on a hand grenade range was standing behind an 8ft high barrier when an M67 fragmentation grenade, thrown by another soldier, detonated approximately 30 meters forward of the barrier. He was hit in the *back* of the upper right arm by a disk-shaped fragment about a ¼in across. It appeared that the fragment came over the barrier and with a Frisbee-like effect doubled back and hit him from behind.

Today what is called the "lethal area" is calculated using projectile fragment masses, number of fragments, and velocity, which differs from different parts of the projectile. The lethal area is determined to be the area in the vicinity of the bursting projectile in which standing personnel will be sufficiently wounded to prevent them from continuing the attack within five minutes of being wounded.

Which German grenade required to be STRUCK ON A SOLID OBJECT to arm it?

None. Motion pictures and television, especially older films, occasionally depict German soldiers striking stick hand grenades against their boot heel, presumably to activate a percussion or chemical delay fuse. No such grenade ever existed in the German inventory. Most German grenades in World War I and II used friction igniters with a pull-cord to ignite the delay fuse. The Japanese did use percussion-activated hand grenades, which were notorious for their high percentage of duds due to poor weather sealing. The grenade was armed by pulling an arming fork or pin from the percussion-igniter, removing the brass protective cover (it would fall off), and striking it on a solid surface such as a boot heel, helmet, rifle stock, rock, tree trunk, etc. This caused a firing pin to strike the percussion cap and ignite the delay fuse. It may have been an assumption on movie-makers' part that the Germans used the same type of grenade igniter, but more likely it was because they wanted to show them doing something different from the Allies to activate grenades.

Why do some hand grenades have EXTERNAL FRAGMENTATION SEGMENTATIONS?

Most modern fragmentation hand grenades have smooth bodies with an internal fragmentation liner. The World War II **US "pineapple" Mk II**[137] hand grenade is a prime example of external fragmentation segmentations, often incorrectly called "serrations." Many other older fragmentation grenades also had external segmented bodies. Actually, pre-cast fragmentation segments on a grenade's exterior do little to ensure even or effective fragmentation. To be truly effective the fragmentation scoring must be on the interior of a grenade's body to ensure complete breakup. Very few grenades have been so fabricated. The author has found large numbers of "pineapple" grenade fragments on grenade ranges with two to six segmented sections still in a single piece. The first grenades to be made with external fragmentation segmentations were the British "Mills bomb" of 1915, which became the model for many of the world's grenades including the US Mk II. It is thought that Sir William Mills (1857–1932) actually introduced the segmented grenade body to provide a firm grip with a muddy hand so common in the trenches of World War I.

During World War II some countries used blast-type grenades with thin smooth bodies. They sometimes had slip-on fragmentation sleeves with segmentations, which could be attached to increase their lethality. Most modern grenades have smooth bodies with some form of internal fragmentation liner ensuring more uniform and increased fragmentation.

From World War I the French designated their high-explosive grenades "defensive" and "offensive," a practice adopted by the US and some other countries. Defensive grenades were intended to be thrown from cover and generated a high fragmentation effect to disable attacking enemy in the open, that is, thrown from the protection of trenches. Offensive grenades saw the grenadiers in the open attacking an entrenched or fortified enemy. Blast grenades, with some light fragmentation, were used in this instance as the grenadiers were exposed and the grenades used against trenches and pillboxes. Defensive grenades had external segmentations while offensive grenades had smooth bodies. Of course soldiers would use any type of grenade available no matter what the situation was. The practice disappeared after World War II when purely blast-type grenades fell from general use.

Japanese World War II hand grenades sometimes burst with such a shattering effect that the poor grade cast casings shattered into tiny iron "dust-like" particles barely capable of breaking the skin at close range. They had external segmentations, but this did little to help break them up into lethal fragments. Note, that such a shattering effect was not always the case. More often than not they did break up into lethal fragments, but not necessarily along the segmentation grooves. At other times the casings broke into as few as two halves. The same casing shattering effect was encountered with Chinese-made Type 59 and similar stick grenades used in Vietnam. Upon detonation US troops simply turned their backs to them when they landed near them. The "sandlike" fragments' wounds were pin-like pricks and seldom debilitating.

The US M34 WP smoke hand grenade has fragmentation segments on its body, but its small bursting charge is insufficient to shatter the body for fragmentation effect. It only ruptures it sufficiently to allow the WP filler to ignite when exposed to air and to scatter it. The body only splits open. The actual purpose of the segmentations is to warn soldiers that it is a bursting-type, casualty-producing smoke grenade used for knocking out fortifications and attacking personnel in open-topped positions. It can also

be used to create a near immediate smoke screen. The idea though is to prevent it from being confused with a burning-type smoke grenade used for signaling and slowly developing smoke screens. The M34's World War II predecessor, the M15 WP smoke grenade, had a smooth body similar to burning-type smoke grenades and this sometimes resulted in accidental friendly casualties because of this mistaken impression.

What actually is SHRAPNEL?

Fragments generated by exploding projectiles or grenades and shattering or fragmenting the casings are often called splinters, shards, or shrapnel. The terms "splinters" and "shards" are generally considered obsolescent today. "Shrapnel" is technically incorrect to describe fragments, but is commonly used today as a term synonymous with "fragmentation" or "fragments." It is sometimes mispronounced as "shrapmetal" being thought somehow related to "scrap metal" or simply misunderstanding its pronunciation.

Shrapnel was originally a type of spherical artillery shell filled with a bursting charge and small lead balls mixed in, fitted with a time delay fuse, and designed to burst in the air to shower troops from above with a deadly rain. The delay fuse allowed it to be timed to burst at different ranges. The projectile was invented in 1803 by a Royal Artillery officer, Lieutenant Henry Shrapnel (1761–1842; later lieutenant-general and colonel-commandant of the Royal Artillery) (spelt Shrapnell in a number of contemporary sources). It was a hollow spherical cannon shell filled with lead musket balls and black powder, and fitted with a delay fuse. Its first use in combat against the Dutch on Surinam in the East Indies in 1804 led to their immediate surrender owing to the devastating effects of this revolutionary projectile. They were officially known as "spherical case shells," but even then were called "shrapnel." In 1852 the British Government ordered that "spherical case shells" henceforth be known officially as "shrapnel" in honor of its inventor. The concept was used through World War I in modernized projectile designs with mechanical time delay fuses. The time fuse was set to detonate so that it would burst above exposed troops or trenches and blow the lead balls out through the nose by a base detonating charge. Shrapnel projectiles had fallen from common use by World War II, being replaced by normal high-explosive artillery

projectiles with better fragmenting bodies and more effective explosive fillers.

Shrapnel shells are sometimes confused with grapeshot and canister. The canister rounds we are discussing here are those fired from muzzle-loading cannons, not modern canister rounds. Canister (aka "case shot" or "canister shot" – the later is incorrect being a combination of the terms "canister" and "case shot") were typically cylindrical sheet metal casings filled with small lead or iron balls packed in sawdust or sand. They had a wood or iron base (sabot). It is common for them to be miscalled "grapeshot." Canister rounds were used for antipersonnel and functioned with a "shotgun" effect when fired, spraying the mass of shot directly from the muzzle. Grapeshot was similar, but contained much larger round shot; small cannon balls in effect. The balls were held in place on wooden bases by laced rope or wire and usually covered with canvas and looked like a dense cluster of grapes. They were intended for ship-to-ship use as the larger balls could penetrate wood and damage shipboard materials. Both canister and grapeshot could be used against troops or ships depending on the range and the desired effects.

MODERN CANISTER ROUNDS: What are "beehive" or "flechette" rounds?

Fléchette is the French word for dart, derived from *flèche* for arrow, a small arrow. "Beehive" describes the sound the thousands of darts made when fired and passing overhead or nearby with an eerie buzzing sound. Officially, these Vietnam-era rounds were called "antipersonnel" (APERS; often with a "-T" appended for tracer, APERS-T). They were filled with thousands of 8-grain finishing nail-like darts. These were about 1in in length (25mm), 1/16in (1.58mm) in diameter, and had four small fins stamped in the tail end rather than a nail head. Heavier flechettes were used in 2.75in aerial rockets. Interestingly, the flechettes were loaded with half of them pointing to the rear to provide space for as many as possible. When fired they reoriented themselves pointing downrange owing to the fins.

They were intended for direct open-sight fire on enemy troops in the open, but most types could be fired at long ranges as well, to include indirect fire. They were also useful for blasting clear fields of fire and stripping away camouflage from bunkers and other vegetation-concealed

fighting positions revealing them for engagement by other weapons. They could penetrate sheet metal, plywood, and 1in thick wood-sided buildings. APERS-T rounds had a mechanical time fuse, which could be set for muzzle action, in effect turning the weapon into a giant shotgun. When firing at such close-range targets friendly troops were warned to take cover by firing a handheld red star cluster signal ("pop-up") and shouting "Beehive, beehive!"

It is not commonly understood by many that the time fuse could be set to detonate the round far downrange just short of the intended target area. The maximum range setting depended on the specific weapon. Small detonators in the projectile's nose would blow open its aluminum body. In the case of the 105mm howitzer, the bursting XM546 APERS-T projectile would blast 8,000 flechettes forward in a cone-shaped pattern 300 meters in length and over 90 meters wide be it from the muzzle or up to 12,400 meters downrange in the indirect-fire mode. The 105mm tank gun's M494 APERS-T round with 5,000 flechettes had the same effect up to 4,400 meters range. This makes APERS-T rounds effective for engaging wire-guided antitank missile launch sites while the missile is still in flight toward you so as to knock out the gunner guiding the missile. Most APERS-T rounds had a yellow or black smoke charge in the base that marked the point of detonation to allow observers to adjust the beaten zone.

APERS (without the "-T") rounds did not have a tracer, smoke marker, or time delay fuse. They activated at the muzzle only in a manner similar to a modern canister round (see below). An olive drab projectile, a yellow band, white markings, and a ring of white diamonds identified APERS-T rounds. During the Vietnam-era, APERS-T rounds were available for the 105mm howitzer, 90mm tank gun, 105mm tank gun (not used in Vietnam), 152mm tank gun, 106mm recoilless rifle, and 2.75in (70mm) aerial rockets; APERS were available for the 90mm recoilless rifle and 40mm grenade launcher (they were experimental only, and had limited field testing)[138]. Flechettes are also used in 12-gauge shotguns with 20 1in flechettes to a shell. The aerial rockets were detonated by a proximity fuse and had a red smoke charge (black or yellow would be difficult to see from the air against a forest or brush background), and were issued in different weight flechettes (10-, 20-, and 30-grain; current rockets use 28- and 60-grain). The navy developed a muzzle-activated 81mm flechette round for its Mk 2 Mod 1 direct-fire mortar mounted aboard certain coastal patrol boats and riverine

craft, which of course could not be used in conventional indirect-fire mortars. In 2010 the navy introduced a new 2.75in flechette rocket for Marine helicopters. The flechettes are larger than any previous for improved penetration. There is also a flechette round for the 84mm M3 Multi-role, Antipersonnel, Antiarmor Weapons System (MAAWS), the Carl Gustav used by US SOF.

A few weapons were used in Vietnam that still had Korean War-era canister rounds. These had a cylindrical-shaped fiberboard housing containing hundreds of small, cylindrical steel slugs stacked in columns. When fired the housing split open and the slugs provided a shotgun effect from the muzzle with a limited effective range. These included the 57mm M18A1 recoilless rifle, 90mm tank gun (M48A2/A3 tank), and 76mm tank gun (M41A3 light tank used by the Army of the Republic of Vietnam).

The Soviets took artillery flechettes a step further, although they were not widely issued. Their flechettes were much larger, almost 4in (100mm) long and about 3/8in (10mm) in diameter. They too had mechanical time fuses to achieve airbursts over the target at long ranges. The finger-sized flechettes would shred trucks, lightly armored vehicles, communications-electronic equipment, and supply stockpiles plus penetrate up to three layers of sandbags. Their concept was to use them to attack unit assembly areas, command posts, artillery and air defense positions, communications sites, truck convoys, etc. in the enemy's rear.

The US Army and Marines have a new canister round for the M1A2 Abrams tank. This is the 120mm M1028 canister round, which entered service in 2005. It contains some 1,100 approximately 3/8in (10mm) diameter tungsten steel balls. It works on a muzzle-action like a giant shotgun with an effective range of up to 700 meters. It was developed to take out enemy antitank teams and troops in the open or behind light cover with an optimum 300-meter range. It is still effective beyond that, but the spread increases drastically, greatly reducing hit probability. It can also be used against "soft-skin vehicles, lightly constructed buildings, and troops concealed behind board fences, heavy brush, etc. The hardened steel balls provide better penetration than lead or mild steel. It can also be fired on friendly buttoned up AFVs being swarmed by enemy infantry ("back-scratching"), although that seldom occurs today. A similar 105mm XM1040 canister round was developed for the M1128 Stryker mobile gun system and is effective up to 500 meters. While not yet type classified, the

XM1040 has been used in combat. Even though these have been incorrectly called “beehive” rounds by the media and commentators, they are not, they are canister rounds.

The use of flechette and canister rounds is not prohibited by the Hague Convention or other agreements.

When was the first irritant CHEMICAL HAND GRENADE employed?

Chemical grenades were first used in the 9th century BC at the ancient Egyptian capital of Fustat (well before explosive grenades were first used in 1427 at the siege of Casalmaggiore, Italy). The Egyptians filled earthenware jars with wet quicklime (CaO) and threw them to break open to choke, blind, and harass the attacking enemy with vaporous fumes. This also makes it one of the first expedient weapons, well, other than sticks and stones, and there is no reason that it would not still be effective in some circumstances.

In more modern times it was the French who developed the tear gas *lacrymogène* (lachrymatory – irritant agent) hand grenade in 1912 for riot control purposes and flushing criminals out of buildings. Such tear gas grenades saw their first military use in World War I, very limited use in World War II and the Korean War, and wider use in Vietnam. It is now illegal for the US armed forces to use tear gas grenades other than on US territory (including embassies and consulates) or to protect nuclear weapons.

FACT:
While not deployed by chemical grenades, there is evidence that the Sasanian Persians employed chemical warfare in 256 AD against the Romans defending Dura-Europos on the Euphrates River in modern day Syria. The Persians were tunneling beneath the city walls in an effort to collapse them and the Romans were digging a counter-mine tunnel to intercept the Persian tunnel. The attempt was detected by the Persians and they had charcoal braziers and hand-billows ready for when the tunnel walls were busted through. A mixture of sulfur and

bitumen was thrown into the fires. This produced sulfur dioxide (SO_2). This is not an asphyxiate, but a respiratory and eye irritant. There would be some carbon monoxide (CO), but what made it fatal is that the fumes displaced oxygen owing to the confined 2x2-meter tunnel and poor air supply from the surface. When the site was excavated, the remains of some 20 Roman soldiers with all their weapons and equipment were found where the tunnels met. It appears their bodies had been stacked by the Persians as a breastwork to defend their tunnel.

The most recent addition to the irritant chemical grenade family is an Indian-made crowd control grenade introduced in 2010. It is packed with finely ground seeds of the bhut jolokia chili pepper (aka ghost pepper), declared by the *Guinness Book of World Records* to be the hottest pepper in the world.[139] The bhut jolokia measures 855,000–1,050,000 units on the Scoville scale, twice as hot as the next fieriest pepper, the Mexican red savina habanero pepper at 350,000–1,050,000. The bhut jolokia is 200 times hotter than Tabasco sauce – 2,500–5,000 units on the Scoville scale. A jalapeño, by contrast, registers a measly 10,000 on the Scoville scale. When the grenade bursts it spreads a non-toxic mist that burns the eyes, nostrils, and mouth so severely it causes temporary blindness, airway irritation, and breathing difficulties for hours. The idea came from the pepper's longtime use to ward off rogue elephants. Peppers were burned in fires and the vapor drifted in the smoke – downwind from the elephant-harassed village.

Where does the nickname "MOLOTOV COCKTAIL" come from?

The term Molotov cocktail (sometimes misspelled "Molotoff"), is said to have originated during the 1936–39 Spanish Civil War. Soviet soldiers fighting on the side of the Spanish Republicans are credited with having first used it as an expedient antitank weapon and its use became widespread. It was named in "honor" of Vyacheslav M. Molotov (1890–1986), the People's Commissar for Foreign Affairs who oversaw the

USSR's involvement in the conflict. It is also said that while the "fire bottle" came into wide use in Spain, that the name was actually bestowed during the 1939–40 Winter War between the USSR and Finland. The answer will probably never be known.

Molotov was not the actual inventor, that inventive individual is lost to history. Interestingly, the Soviets did not call it a "Molotov cocktail" as this signified disrespect for a senior government official – "politically incorrect" in the USSR so to speak. Instead they called it a "bottle with flammable mixture." The concept predated the Spanish Civil War though. It is known that they were employed by Ethiopians against Italian tanks during the 1935–36 Abyssinian War (Second Italo-Ethiopian War). It is possible that similar kerosene-filled (coal oil) bottles were used during the American Civil War, but this has not been confirmed.

What was the first INCENDIARY GRENADE?

Incendiary grenades first appeared in the early 1700s and were used by the Royal Navy and later by the US and other navies. These consisted of an approximately 2½in (63mm) diameter fire- glazed clay sphere filled with a sticky mixture of potassium nitrate (saltpeter), sulfur, rosin, and pitch … they didn't smell very good. The sphere was molded with a number of ½in holes, which were plugged with tufts of cloth soaking up the sticky filler material. Taken aloft by marines into ships' rigging, they were placed in charcoal blazers to ignite the cloth plugs, pulled out by a wire-attached leather thong, and flung on to enemy ships in an effort to ignite gunpowder stores, sailcloth, and wood (deck and hull seams were caulked with flammable pitch or hemp fiber soaked in pine tar).

In November 1864 a group of Confederate saboteurs attempted to ignite a swath of fires in New York City by igniting 402 bottles of Greek fire mixture (sulfur, saltpeter, charcoal, and quicklime). Their targets included 13 hotels, a museum, other buildings, and moored ships. The Greek fire mixture proved to be weak and few fires spread. The fire department and police also responded very effectively to thwart the plan.

An earlier and more powerful nautical incendiary weapon was the firepot. These were approximately 8in (200mm) diameter or larger, wide-mouth clay pots, often with four clay handles similar to those on a coffee

cup. The pot was filled with a mixture of several pounds of saltpeter, sulfur, pitch, and pig fat. This fragrant mixture was thoroughly mixed after moistening with alcohol, which would soon evaporate, and the compound hardened after being poured into the pot. Another form was to tightly pack the pot's bottom half with course gunpowder and the top with various prescribed flammable mixtures. The opening was closed with a clay or wooden lid or canvas impregnated with melted sulfur. When employed, a short length of slow match (gunmatches – very slow burning fuse-like cord) or burning tapers were attached. When ships were engaged deck-to-deck – "Bring us within pistol shot Number Two" – the firepots would be tossed onto the enemy's deck, a favorite technique of pirates. The pots shattered and the fiercely burning and spark-spewing sticky ball of flaming hell would roll about the deck starting fires, igniting gunpowder, and driving crews away from their guns plus blinding them with smoke and fumes. They appear to have been used through the 1600s and into the mid-1700s when the grenades became popular. Smaller ceramic fire grenades, shaped like a toy spinning top, filled with oil and fitted with a short length of flammable twine through a hole in the top, date back to the 11th century.

Modern incendiary grenades, introduced during World War I, are filled with thermite or thermate and are mainly used to destroy enemy weapons and equipment or to destroy one's own to prevent its capture. Thermate burns at 4,330°F (2,387°C) allowing it to melt through steel. Thermite is a mixture of finely powdered aluminum and iron oxide while thermate, used by the US, is an improved form with the addition of barium nitrate.

Which is correct, flammable or inflammable?

According to *The American Heritage Dictionary*: "*Flammable* and *inflammable* are alike in meaning and interchangeable in literal usage. *Flammable* is especially appropriate in technical writing and where the term serves expressly as a warning, since it is less susceptible to confusion than *inflammable* …"

One dictionary consulted under *flammable* said "see inflammable" and there said "see flammable."

Are POISON GAS GRENADES practical?

Toxic gas grenades were proven to be largely ineffective. They delivered too small a quantity of lethal chemical warfare agents to have any significant effect in the open. If thrown into an enclosed structure they were slower reacting on the occupants than fragmentation, blast, or WP grenades or satchel charges. They could also endanger the users due to their short throwing range and required the wearing of gas masks, a major inconvenience causing discomfort and restricted vision. It also hampered attackers from entering and searching buildings and fortifications to search them. If the goal was to simply flush the enemy out of a structure, a strong irritant (tear) gas was more effective and faster acting. However, this said, there was at least one instance of toxic gas grenades being employed in World War II described below. Toxic gas and tear gas grenades were envisioned largely as antitank weapons. They were to be thrown at tanks and fumes were expected to enter the tank through ventilators and vision ports either to incapacitate or otherwise hamper the crew forcing them to abandon their vehicle, or at least temporarily blind the crew. The reality was that very little of the gas had time to enter the few small openings and vents before the tank merely drove out of the gas cloud. The gas effects were far from instantaneous usually allowing the crew to react – by donning masks or evacuating the vehicle.

The employment of toxic gases was and is prohibited by the Hague Protocol, but the use of irritant gases is allowed. Many countries today will not use tear gas in combat, but will use it against their own citizens in civil disturbances and crime situations. The US, while using irritant agents extensively in Vietnam, now will not use them on foreign soil other than to protect nuclear weapons and embassies, which after all, are US territory.

Japanese Type 1 (1941) frangible gas hand grenades (*seisan shurdan*) were captured in 1942 on Guadalcanal and in Burma and Malaya. They are not known to have been used on Guadalcanal or in Malaya. They were employed against British tanks near Magwe Aerodrome, Burma by Thai troops allied to the Japanese on April 14, 1942 and by Japanese troops on the 16th. They had little effect even though they were intended as antitank weapons. One British M3 Stuart light tank was halted and captured. Details are not available, but it appears they were also used against the Chinese.

These grenades had spherical glass bodies filled with liquid hydrocyanic acid, a blood agent,[140] which when broken dispensed the gas; no bursting charge was required. They were identified as "T.B. grenades" by Allied intelligence. One source reports that "T.B." meant "tick bomb," but this is totally incorrect. Japanese is read right to left so "T.B." is actually read "B.T." (*bi-chi*), which refers to the Soviet BT light tanks encountered during the 1939 battle of Nomonhan on the Manchuria-Siberia border. The Japanese were ill prepared to deal with tanks and the toxic gas grenades were one of the means developed to counter them … after the fact. The Japanese soldier called the grenade a *chi-bi* reversing the letters meaning that BT tanks would be "reversed" (halted) by gassing the crews.

The US produced similar M1 frangible toxic gas hand grenades in 1942 filled with hydrocyanic acid or lewisite.[141] The bottle-shaped grenades, having never been fielded, were declared obsolete in August 1944 and destroyed later in the year as they were proven ineffective and were too dangerous to transport and store in the field.

Who dreamed up the FLAMETHROWER?

Legend has it that prior to World War I during German Army maneuvers an unnamed major was ordered to defend his position at all costs. In danger of being overrun, and in desperation, the major picked up a fire hose and turned it on the attackers. During a staff critique (after action review) he was asked what he thought he was doing. He replied that he was spraying simulated burning oil on his attackers. This is said to have engendered the idea of the modern flamethrower.

Such an event occurred in 1907 at Posen during a fortress assault exercise, but not exactly the way it is related. The Posen Fire Brigade was employed to spray water from a steam-powered fire pump to simulate liquid fire. This was done to demonstrate the possibilities of the flame projector concept. A man-portable flame projector had already been patented in 1901 by a German scientist named Richard Fiedler. The demonstration served to encourage further development. The first model was accepted in 1911 and two flamethrower battalions were organized in 1914; interestingly under the command of a former Leipzig firefighter, Captain Hermann Reddemann. The first use of the *Flammenwerferapparate* (flame projector apparatus)

was against the French at Melancourt in the Verdun sector on February 26, 1915. It was first used against the British on July 30, 1915 at Hooge, Belgium. The US Army made some copies of the simple German M.16 flamethrower and they saw very limited use in 1918 as the Boyd No. 3 and knapsack flamethrower Mk I. There are reports of some type of flamethrower being used by the Japanese at Port Arthur during the 1904–5 Russo-Japanese War. This is believed to actually have been oil sprayed by hand pumps onto Russian barricades and ignited by hand grenades. The Russians also poured oil down ramparts and ignited it with grenades as well as using cans of kerosene with small bursting charges.

The US did not begin development of a modern man-packed flamethrower until July 1940. The development of US tank-mounted flamethrowers began in 1943 and were mounted on M3 Stuart light and M4 Sherman medium tanks, and LVT-series amphibian tractors. Man-packed and tank-mounted flamethrowers saw extremely wide use in the Pacific, but were less used in Europe. In Europe it was found that the flamethrower's psychological effect often had as much impact as its direct use. US troops would approach a defended bunker, squirt a burst of flame in view of the firing embrasure, and the defenders more often would quickly surrender.

Flamethrowers gradually fell from use in the post-war years. They saw some use in Korea and very limited use in Vietnam, at least in the man-packed mode. In Vietnam the US Army employed the M132A1 mechanized flamethrower ("Zippo" – turreted M10-8 flamegun on an M113A1 APC) and the Marines used the M67A2 flamethrower tank (an M48A3 Patton tank with a M7A1-6 flamegun replacing the 90mm gun). The navy built a number of riverine monitors ("Zippo boats") mounting a pair of M10-8 flamegun turrets as used on the M132A1 mechanized flamethrower. More often than not, tracked and waterborne flamethrowers were used simply to burn away concealing vegetation, destroy abandoned enemy structures, burn grass growing within perimeter barbed-wire barriers and canal banks, and burnout unit garbage dumps outside firebases.

US man-packed or portable flamethrowers included the M1 (1942), M1A1 (1943), M2-2 (1944), M2A1-7 (early 1950s), M9-7 and M9A1-7 (early 1960s), and experimental E36-7 (1965, modified M9-7). (The appended hyphenated number [-7] following flamethrower designations is a Chemical Corps practice and designates the flamegun model – in this case

the M7, which obviously was an effective model owing to the span of its service.)

Portable and vehicle-mounted flamethrowers are no longer employed by the US Army or the Marine Corps. The 66mm four-tube M202, M202A1, and M202A2 "Flash" incendiary rocket launchers were fielded to replace flamethrowers in the mid-1970s.[142] The "Flash" was field tested in Vietnam in the late 1960s as the XM191 with the XM74 incendiary rocket clip (each clip contained four rockets). The XM191 was also capable of firing XM78 HEAT/controlled-fragmentation and XM96 irritant gas (CS) rocket clips, but these options were dropped and when type classified the system was adopted as the M202 with only the incendiary capability. The M202A2 was withdrawn from use in the mid-1990s, mainly because the thickened pyrophoric agent-filled M74 incendiary rocket clips tended to dangerously leak in storage. There were also problems with suitable practice firing ranges owing to its bursting incendiary nature.[143] No new weapon capable of projecting flames or delivering incendiary projectiles has been fielded by the US.

Few countries today employ flamethrowers. A few types of flame, incendiary, and fuel-air explosive munition (thermobaric) shoulder-fired rocket launchers are found in limited use by some countries. The USSR/Russia was especially active in their development. In recent years Russia has used man-packed flamethrowers in Chechnya to clear defended buildings and Turkey has used them against Kurdish nationalist guerrillas. Flamethrowers and other incendiary weapons are not prohibited by the Hague Convention.

What were the LARGEST CALIBER ARTILLERY PIECES?

The largest caliber artillery piece would be the **US 914mm (36in)**[144] **T21 "Little David" mortar** of World War II. It was developed to test the terminal effects of aerial bombs rather than having to drop them from an aircraft. It merely fired them a short distance, which saved time and was not reliant on the weather and aircraft availability. It was decided this massive mortar could be used to defeat heavy concrete fortifications such as expected in Germany's "Siegfred Line" (what the Germans called the *Westwall*). A "mobile" mounting was developed and it was approved for

employment in October 1944. The “Little David” was not ready for deployment to Germany though and the assault on the *Westwall* had commenced the month before. However, it was planned to use it in the November 1945 invasion of Japan. Its 6-mile (9.7km) range was considered too short though, it had an extremely slow rate of fire, exceedingly lengthy emplacement and displacement time, and it was not a very accurate weapon, a quality essential for effectively attacking fortifications – lending credence to an artillery unit using the motto, “We may be slow, but we’re inaccurate.”

The 22ft (6.7m) long rifled barrel with its cradle and firing mechanism weighed 80,000lb (36,290kg). The mounting base containing the controls, recoil system, and elevating and traversing mechanism was a large rectangular steel box weighing 93,000lb (42,185kg). The barrel and base were each transported by a two-axial, eight-wheel limber towed by armored M26 “Dragon Wagon” heavy equipment transporter tractor-trucks, normally used to tow tank transporters. A Loraine M2 truck-mounted crane with a clamshell bucket and a Caterpillar D7 bulldozer were part of the firing battery’s equipment. These dug the mounting base pit with a 12 degree slope ramp and the base mounting box was backed in. The tractor was driven out and the crane hoisted out the rear boggy wheels. The pit was floored with railroad ties and the sides backfilled and tamped with a pneumatic hammer to hold the base solid. The base box’s top was flush with the ground once emplaced. This required some 12 hours. To muzzle-load the “Little David” the barrel was placed in the horizontal position with the muzzle just above ground level and a davit was used to hoist the 3,650lb (1,678kg) T1 HE-concrete-piercing projectile into the muzzle after loading the donut-shaped propellant charge bag with a rammer. With the projectile’s pre-rifled groves aligned with the bore’s rifling, the projectile was shoved just into the muzzle, the barrel was elevated allowing the projectile to slowly slide down the barrel to seat, and then the barrel was hydraulically lowered to the necessary firing elevation and traversed by an electric motor. A typical crater was 38ft (11.5m) across and 13ft (4m) deep, actually deeper, but partly refilled with displaced soil. With the war’s end the project was abandoned. Only one “Little David” was built and it (barrel and base in their transport mode) is on display with an inert T1 projectile at Aberdeen Proving Ground, MD.

There was another artillery piece only 5.5in (140mm) smaller in caliber than the "Little David." However, the sheer size and mass of the German *80cm Kanon (Eisenbahngeschütz)* (31.5in cannon [railroad gun]) otherwise dwarfed the "Little David." In 1941 *Friedrich Krupp A.G.* built two of these behemoths, the *"Gustav"* (aka "*schwere Gustav*") and "*Dora*." They were named after Gustav Krupp and Dr. Erich Müller's ("Kanonen-Müller") wife, Krupp's chief engineer, respectively. Also studied were 70cm and 100cm gun designs, but they were never constructed. The 80cm guns could fire either 10,500lb (4,763kg) HE or 16,500lb (7,484kg) concrete-piercing projectiles sent on their way by up to 2,500lb (1,134kg) of propellant to a range of 29 miles (46.6km) from the 106.5ft (32.48m) long barrel. The HE round created a 30ft (9.1m) deep, 30ft diameter crater and the concrete-piercing round was claimed to be able to punch through 264ft (80m) of reinforced concrete. It is doubtful that it could actually penetrate so deeply. The rate of fire was one round every 30 to 45 minutes.

The gun, its equipment, ammunition, and crew were transported aboard 25 special railroad cars and when assembled it weighed 1,344 tons (1,219,276kg). A spare barrel accompanied the guns (barrel life was 300 rounds). It was assembled on-site on two special parallel railroad tracks and supported by 160 wheels. The tracks were laid on a curved path as the gun could not be traversed on its mount and the curved track enabled the gun to be laid by moving it on the track. Its 500-man crew included a pioneer (engineer) company to build the firing position and lay the tracks, which required three to six weeks. The complete support for the gun was 1,420 troops, which included two air defense batteries, two guard companies, and an intelligence element to select targets, all commanded by a colonel – Army Artillery Battalion 672 for the "*Gustav*." They were originally designed to defeat France's Maginot Line, but were not ready in time for the 1940 German invasion. They were also to be used for the planned Gibraltar assault (Operation *Felix*), if Spain had been accommodating. "*Schwere Gustav*," as though there was really a need to additionally identify it as "heavy," was used in the April 1942 siege of Sevastopol, USSR at which it fired only 48 rounds, but caused immense destruction. "*Dora*" never fired a shot in anger, although it was deployed west of Stalingrad. From 1943 with the Germans on the defensive and being pushed back there was no longer a real need for the massive siege weapons. "*Dora*" was dismantled and destroyed to prevent its capture by the Soviets in 1945. The

US seized "*Gustav*" at the war's end and the British discovered an incomplete third gun at the Krupp factory. Both were scrapped. While impressive, the cost in production effort, materials, support, manpower, lengthy movement and emplacement times, restrictions on where it could be moved owing to rail line limitations, marginal accuracy, and its vulnerability when emplaced, it would have been much more practical and cost effective to merely employ medium bombers modified as dive-bombers with standard 1,400kg (3,200lb) bombs.

FACT:
Krupp traditionally gave the first gun of a new type to the government without charge. "*Gustav*" cost the government nothing, but Krupp charged seven-million *Deutschmarks* for "*Dora*," the one that never fired a shot in anger.

What was the largest caliber SELF-PROPELLED GUN?

In World War II, these were the **German** *Karl-Gerät* **040 and 041**. These were full-tracked short-barreled siege howitzers, but for long distance movements special transporter trailers were provided. Seven *Karl-Geräte* 60cm (24in) 040 and 54cm (21.2in) *Karl-Gerät* 041 howitzers were built. The barrels were interchangeable on some mounts with ranges of approximately 6,500 and 10,000 meters, respectively, firing 2-ton projectiles.

The largest post-war self-propelled gun was the **Soviet 2B1 *Oka***[145] 420mm (16.5in) gun-mortar on a full-tracked chassis. It was a 1957 experimental weapon designed to counter the US 280mm "atomic cannon" (see below). When first displayed, US analysts thought the *Oka* was a mockup propaganda weapon intended as a deterrent. It had an astoundingly long 65.6ft (20m) barrel firing a fin-stabilized projectile 27 miles (45km). However, the recoil was too strong for the mount and chassis and the project was cancelled in 1960.

The largest pre-modern howitzer was the Czar Cannon (*Tsar Pushka*) built in 1586 by Czar Feodor (1557–98) and founded by Andrey Chokhov. The 890mm (35in) muzzle-loading cannon weighs 42 tons (38,100kg) and

has a 17.5ft (5.34m) long barrel. The *Guinness Book of World Records* certifies it as the largest howitzer, as opposed to guns or mortars, ever built. It is thought that it was never fired and may not have been intended to be, although there is speculation that it was met to fire stone grapeshot and not full-bore cannon balls. Instead, the cannon, embossed with decorative reliefs, may have been purely for display to impress visiting dignitaries. The original wooden carriage was destroyed by fire during the 1812 Moscow real estate dispute with the French. A new decorative fireproof iron carriage was built in 1835 in St Petersburg and four 2-ton (1,814kg) cannon balls were cast at the same time. The display cannon balls are actually 36in (915mm) in diameter and cannot be loaded. They were cast in St Petersburg and lore has it that they were larger by about 1in because of a friendly rivalry between St Petersburg and Moscow. The reality is they were intentionally made larger so that they could *not* be fired. No czar wanted *his* cannon to be turned on his palace or possibly it was to preclude some future attempt to fire it and cause the ancient gun to burst. This also lends credence to the cannon's display-only theory. The Czar Cannon sat across from the Kremlin Arsenal in Moscow until 1960 when it was moved to Ivanovskaya Square at the Cathedral of the Twelve Apostles. A replica using lighter alloys, built in 2001, rests in Donetsk, Ukraine. The un-fireable replica and four oversized cannon balls were made in Izhevsk, Russia and were presented to the people of the Donets Basin as a symbol of friendship between the Russian and Ukrainian peoples – I guess the gift of a big cannon *could* symbolize undying comradeship.

What were the largest GUNS MOUNTED ABOARD SHIPS?

Since we are on the subject of the largest guns, what were the largest guns mounted aboard battleships during World War II and prior to the war?[146] The Royal Navy used 14in (355mm), 15in (380mm), and 16in (405mm) guns, the US 14in and 16in plus a few 12in (305mm), the Germans 11in (28cm) and 15in (38cm), the Italians 12.5in (320mm) and 15in, the French 13in (330mm) and 15in, the Soviets 16in (but the battleships to mount them were never completed), and the Japanese 14in and 16.1in (409mm).

The largest gunned battleships though were the Japanese *Yamato* and *Musashi* (two more examples of this class were under construction, but

never completed). They were each armed with nine massive 18.1in guns (460mm, what they called "40cm" as a deception that they were armed with 16.1in). The runner up would be the unique British "large light cruiser" with two 18in (457mm) guns, the HMS *Furious*. Prior to commissioning in 1917, she was converted to an aircraft carrier while retaining one of the guns. Firing trials showed she could not withstand the recoil and the gun was soon removed. Two Royal Navy monitors later each mounted the same type of 18in gun. Interestingly, the British 18in shell was heavier than the Japanese even though fired from a much lighter mounting. Just for the record, the largest guns mounted on submarines were on the Royal Navy's four M-Class submarines (M1 through M4) of 1920–32. They mounted a single centerline-fired 12in gun. At the time it was not thought that torpedoes were accurate enough at over 1,000yd.

What was the ATOMIC CANNON?

The US Army built 21 of the 11in (280mm) M65 motorized guns in the early and mid-1950s, aka the "atomic cannon" or "Atomic Annie." They became operational in 1952 with several battalions deployed to West Germany as corps artillery while one battalion remained in the States. A battalion had three two-gun batteries, although some battalions apparently had only two batteries and some batteries only one gun. A battery was temporarily deployed to South Korea in 1958 as a show of force.[147]

The barrel was massive being 42ft 9in (13.1m) long and weighed 42,500lb (19,278kg). Its range was 18 miles (29km). The M350 atomic projectile weighed 800lb (363kg) and contained a W19 nuclear warhead backed by a 150lb (68kg) propellant charge. The M350 was in use from 1955–63. The earlier, shorter T124 threw a W9 nuclear warhead and was in use from 1952–57. Only 80 of each of the T124 and M350 nuke rounds were produced.

The only nuke shot, using a T124 round, was fired on May 25, 1953 at Frenchman Flats, Nevada Test Site, AZ. The 15-kiloton yield projectile, fired at a 17-mile (27.3km) range, airburst at 500ft (150m) creating an over 500ft high fireball during Test GRABLE. Minimum range was 7 miles (11.26km). The gun also fired a conventional 600lb (272kg) M124 HE projectile, but this was mainly used as a ranging round even though the HE

and nuke rounds were not ballistically matched. The HE round did provide the "Atomic Annie" with a conventional capability. It is sometimes claimed that the Frenchman Flats shoot was the only shot fired by the guns, but over 1,000 HE rounds were fired just in testing the first guns and many more during crew and unit training.

The gun's design, especially the carriage, was loosely based on the German 28cm K5 railroad gun, commonly known as the "Anzio Annie,"[148] on which "Atomic Annie" was a play on words. The mount was built by the Baldwin Locomotive Works. The gun and carriage were transported by a pair of independently steerable tractor-trailer trucks. The M249 (front) and M250 (rear) heavy artillery transporters literally lifted the gun and carriage off the ground when moving it. The entire assemblage with transporters was 84ft (25.6m) in length and weighed 83.3 tons (75,570kg). It had a 22-man crew, over twice the size of most conventional artillery piece crews. Regardless of its massive size, it could be placed in the ready to fire mode from the transport mode in less than 10 minutes, the record being seven minutes.

The "Atomic Annie" dwarfed the Army's previously biggest mobile field artillery piece,[149] the 240mm (9.4in) "Black Dragon" M1 howitzer used in World War II and the Korean War. It was hauled in two components (barrel and mount) and had a 27ft 7in (8.38m) barrel. Five T92 self-propelled "King Kong" versions were built (115 planned), and while intended to be used in the invasion of Japan, they never saw action. They used a modified (stretched) M26 Pershing tank chassis and were the largest US self-propelled artillery piece. Interestingly, the 8in M1 gun, using the same carriage as the 240mm, was actually a heavier weapon by 4,540lb (2,060kg) owing to its longer barrel. Both the 240mm M1 howitzer and the 8in M1 gun were transported in two pieces on cannon and carriage transport wagons towed by full-tracked M6 high-speed tractors. A rumor persists that the "Atomic Annie" was simply a re-bored 240mm, but this is completely unfounded. The 280mm atomic cannon was a much larger weapon of entirely new and different design than the 1943 "Black Dragon." There was also a single developmental 240mm T1 gun mounted on the same T72 carriage as the 280mm atomic cannon. Intended as a possible replacement for the 240mm M1 howitzer and 8in M1 gun, it is not thought that a nuclear round was planned for it. The one example is located at the Virginia War Museum, Norfolk.

There was another "atomic cannon," this one belonging to the US Navy, the 16in (406mm) Mk 7 gun standard on Iowa-class battleships. This was tested in 1968 and 1969 in the form of a 15–20-kiloton yield W23 warhead in a reworked 16in Mk 13 high-capacity high-explosive projectile. It was known as the Mk 23 "Katie" and 50 rounds were produced and available for use from 1956 to 1962. It is not known if they were actually deployed on battleships. Three of the Iowa-class were modified (the USS *Missouri* was not) allowing 10 projectiles to be stowed in the Turret II magazine along with nine Mk 24 practice projectiles. No nuclear rounds were ever fired and only one practice round is known to have been expended.

Another use was made of the 280mm projectile in the navy's 16in sabot projectile, which was discarded after firing with a 280mm HE round (not nuclear) contained inside to extend the gun's range. There were 23,000 280mm HE rounds available. The project was cancelled though.

While any large gun is impressive, the concept of the atomic cannon was obsolescent the day it was fired at Frenchman Flats. It was difficult to transport, especially in Germany and Korea as it had to negotiate narrow streets winding through small towns and villages (being top heavy they were known to tip over when attempting tight turns), too heavy to cross many bridges, and was easy to detect by enemy aircraft when displacing and in a firing position (although they were protected by HAWK air defense missile batteries). The nuke projectile could more easily and rapidly be delivered by high-performance aircraft and tactical missiles (Corporal, Sergeant, LaCrosse, Honest John, Little John), which are what made the gun obsolete. Additionally, nuclear rounds being developed for the much more mobile and concealable 8in and 155mm towed and self-propelled howitzers were fielded in 1957 and 1963, respectively. The atomic cannons were retired in 1963 and most of the artillery units converted to launch nuclear-capable Sergeant MGM-29 missiles. Eight atomic cannons are on public display today along with three inert projectiles, as listed here:

- Army Ordnance Museum, Ft Lee, VA (with prime movers and projectile) [Previously located at Army Ordnance Museum, Aberdeen Proving Ground, Aberdeen, MD prior to 2011]
- Atomic Museum**,** Kirkland Air Force Base, Albuquerque, NM (with prime movers and projectile)

- Field Artillery Museum, Ft Sill, Lawton, OK (gun only and projectile) [Number 9 gun that was the only one to fire a live nuclear round in 1953]
- Freedom Park, Junction City outside of Ft Riley, KS (gun only)
- Memorial Field, Rock Island Arsenal, Rock Island, IL (gun only)
- Virginia War Memorial Museum, Newport News, VA (gun only)
- Watervliet Arsenal, Watervliet, NY (where they were built; only a barrel is on display)
- Yuma Proving Ground, Yuma, AZ (gun only)

The USSR developed its answer to the "Atomic Annie," the 406mm (16in) 2A3 *Kondensator* 2P under the codename *Objekt 271.* Four of the full-tracked self-propelled guns were fielded in 1956. When first observed at the 1957 May Day Red Square parade, Western observers initially thought it was a mockup deception piece and not a real weapon. This was because of the ridiculously long barrel and the simple transport tractor on which it was mounted … it didn't look real. Preferring missiles with longer ranges to deliver nuclear weapons, the 2A3s were retired in the mid-1960s. One remains on display at the Central Armed Forces Museum in Moscow.

What was the PARIS GUN?

This massive 256-ton (232,243kg) railroad-transportable gun was built by *Friedrich Krupp A.G.* in 1917/18 for the purpose of shelling Paris from behind German lines. Called the "*Paris-Geschütz*," it was also known as the "*Kaiser Wilhelm Geschütz*" (Emperor Wilhelm gun). It has incorrectly been called the "*Lange Max*" (Long Max).[150] The gun was by far the world's longest range artillery piece and has never been surpassed in range. It was also the highest altitude firing weapon lofting projectiles into the stratosphere some 25 miles (40km), a record that was not broken until the Germans launched V2 rockets in 1944. The gun reached so high and so far that the earth's rotation (Coriolis Effect) had to be taken into account when calculating the target impact point. After a 170-second flight the projectile impacted 1,290ft (393m) short and 4,406ft (1,343m) to the right of the plotted point of impact so this had to be allowed for. Fired from a position

some 75 miles (120km) east-northeast of Paris, its maximum range was about 80 miles (130km). The projectiles weighed 210lb (94kg) and the original bore was 210mm (8.3in), comparatively small for such a massive weapon. The 102ft (34m) barrel, the last 20ft (6m) was smoothbore, and its high velocity rapidly wore down the bore. The barrel was so long that it required a suspension system to support it and was adjusted for temperature deviation. Each projectile was numbered in firing sequence and each was a fraction of an inch larger in caliber. After the first 65 rounds the gun was returned to Krupp and re-bored to 240mm (9.4in) and the next batch of shells were turned out in progressively larger calibers.

The first "*Paris-Geschütz*" round was fired on March 21, 1918 and the French first thought the explosions were caused by bombs dropped from a high-altitude zeppelin. Collected shell fragments finally revealed they were from artillery projectiles. Searches were made northeast of Paris with fears that a German gun had somehow been impossibly infiltrated through French lines and was hidden close to the city. When the Paris gun fired from its position outside Crépyen Laon, several batteries of field artillery would fire to mask its firing signature from Allied sound locators. It was eventually discovered by aerial reconnaissance, but it was never attacked for unexplained reasons. Possibly it was heavily defended by antiaircraft guns and air patrols.

Up to 20 rounds were fired on some days by the War Navy crew of 80. The Germans say they fired 267 rounds and the French counted 220, of which 183 actually impacted inside Paris city limits. Most of the "misses" landed in suburbs. Possibly the 47 unaccounted for rounds were duds and/or simply landed outside of the city and were unreported. The Germans read the panicky Paris newspaper accounts (captured in trench raids or smuggled by agents) to determine in what parts of the city the rounds were falling as a belated means of adjusting fire. They killed 256 Parisians and wounded about 620. One round struck a church killing 88 and wounding 68. That is about 4.4 casualties per round, but the Paris gun's real value was that it struck terror throughout the Greater Paris area and flustered the French general staff. In that regard it was Germany's first "V" or "vengeance weapon" (*Vergeltungswaffe*) as would be experienced in World War II with V1 and V2 rocket weapons. The gun was returned to Germany and dismantled in August 1918 to deny the Allies the technology. All that was ever found was a spare carriage and some cartridge casings.

Its range has never been surpassed by an artillery piece and another gun did not exceed its altitude record until the efforts of long-range artillery pioneer Gerald V. Bull (1928–90). He fired projectiles from a lenthened 16in gun (406mm; former battleship gun) during Project HARP (High Altitude Research Program) in 1966 to 112 miles (180km). This was an experiment to see if small satellites could be placed in low earth orbit by a gun. Bull, a Canadian, was responsible for the development of a 13.7in (350mm) static test gun with a 147ft (45m) barrel ("Baby Babylon") for Iraq in the late-1980s under Project Babylon. This led to the construction of a never-completed 1m (37.9in) caliber 492ft (150m) long gun ("Big Babylon") intended to bombard Israel and/or put satellites in orbit. Bull's collaboration with Iraq and his assistance in improving Iraqi SS-1 SCUD missiles to enable them to reach Israel led to his assassination.

The Paris gun is often confused with the World War I "Big Bertha," a comparatively short-ranged 42cm (16.5in) L/14 heavy siege howitzer, also known as the *vierundvierzig* (Forty-two). None of the four guns built were railroad-mounted as is sometimes reported, being confused with the previously mentioned "*Lange Max*." The "Big Berthas" weighed 43 tons (39,010kg) and hurled a 1,808lb (820kg) shell only 7.4 miles (12km). The Germans called them the "*Dicke Berta*" (Fat Bertha) being named after Bertha Krupp, the arms industrialist's wife – Bertha Krupp von Bohlen und Halbach (1886–1957) – who was actually attractively slim and trim. "Big Bertha" became a general term to describe any inordinately large artillery piece, although it has fallen from common usage in the missile age and with the virtual disappearance of large-caliber artillery pieces.

How big were the GUNS OF NAVARONE and did they really exist?

In the motion picture, *The Guns of Navarone* (1961), two massive German radar-directed guns were mounted in a tunnel fortification on the Aegean Sea island of Navarone off the east coast of Greece, actually closer to Turkey. The massive guns had to be destroyed by a small British commando force to allow six destroyers to evacuate 2,000 (1,200 in the novel) marooned British troops from Kheros Island, which was soon to be attacked by overwhelming German forces. The troop-laden destroyers would have to

run past Navarone via the Maidos-Navarone Channel – all other channels were mined.

So, how big were those guns? In the 1957 Alistair MacLean novel by the same name, the guns are described at two points. In the beginning of the novel the SOE officer handling the mission stated, "Our naval experts say they're about nine-inch [228mm in the French edition, *Les canons de Navarone*] rifle barrels. I think myself they're more likely a version of the 210mm 'crunch' guns the Germans are using in Italy." This is in reference to seven 21cm (8.2in) K38 cannons used by the German Army. (There was no explanation as to what a "crunch gun" was.)

Later in the novel when the British commando leader reached the gunroom, the guns are described thus:

> Slowly still Mallory approached the guns, walked halfway round the perimeter of the turn-table of the gun on the left, examined it as well as he could in the gloom. He was staggered by the sheer size of it, the tremendous girth and reach of the barrel that stretched far out into the night. He told himself that the experts thought that it was only a nine-inch 'crunch' gun, that the crowding confines of the caves were bound to exaggerate its size. He told himself these things, discounted them: twelve-inch bore if an inch, that gun was the biggest thing he had ever seen. Big? Heavens above, it was gigantic.

In the motion picture the much feared guns appear to be approximately 12in (305mm) caliber, their caliber never being stated.

More realistically, if such guns had been emplaced, they would more likely have been 11in (280mm), a standard German large-caliber gun; specifically the *28cm K5 Bruno* of which 25 railroad-mounted variants were built. It appears the *Bruno* guns served as the model for the mockup guns built for the movie, but they were static guns rather than railroad-mounted.

In reality there are no Navarone or Kheros islands nor were any such large-caliber guns emplaced in the Aegean Islands by the Germans. The Greeks did possess heavy coast defense gun batteries on the mainland, which included four turret-mounted twin 12in (305mm) guns removed from

old pre-Dreadnought US battleships that had served in the Royal Greek Navy.

There are other authenticity/continuity issues regarding the movie/novel's plot. 1) The Germans did not use radar to control or direct coast defense gunfire anywhere. 2) In the story the British were unable to knock out the guns with bombers as they were so well protected, but apparently they did not think to attack the nearby fire control radar site with its exposed dish antenna, which was shown in the movie appearing quite vulnerable. 3) It is curious too how the six Royal Navy destroyers got to Kheros for the evacuation in the first place since all the channels were mined and they could not have run past Navarone's guns. 4) Why was not the Maidos-Navarone Channel mined too, in addition to the guns, with secret lanes and remotely-detonated mines to allow the passage of German ships?

Gregory Peck, who played the commando leader, Mallory, said it would take a complete suspension of belief in reality that six commandos could accomplish such a mission against hundreds of Germans. Aside from those issues, the novel and movie are classics with the story inspired by the 1943 battle for Leos in the Aegean during the Dodecanese Campaign. This was a British operation to seize certain Italian-occupied Greek islands after Italy's surrender. The idea of the book may also have been influenced by Operation *Navarinon*, a 1944 Allied effort to destroy German guns dominating the Straits of Kythera in southern Greece. The name Navarone was no doubt derived from the Bay of Navarinon on the western tip of Peloponnese in Southern Greece. This is where the Ottoman fleet was destroyed by the Greeks in 1827 during the battle of Navarino.

There is an old French twin-mounted 155mm (6.1in) pair of guns in an open concrete coast defense emplacement on Gorée Island off Dakar, Senegal on the west African coast. Locals say they were used in the movie and that *The Guns of Navarone* was even filmed there, but this is a myth perpetuated by tour guides. The movie was filmed at Lindos, Rhodes and the enormously larger mockup guns were built on the set. St. Nicolas Bay has been informally renamed Navarone Bay and local mountains and a cliff were christened with the name as well, again to encourage tourist interest.

A similar story has been applied to four turreted British-made Vickers 380mm (15in) coast defense guns at Cartagena on the south coast of Spain. These guns, though inoperable, remain in place, two at the Castillitos Battery and two at the Cenizas Battery. Local tour guides here too maintain

that *The Guns of Navarone* was filmed here and that these are among the largest artillery pieces ever made. Granted, they are larger than the guns of Navarone, but hardly the largest guns ever.

Interestingly, a two-part episode of the original television series, *Battlestar Galactica* (1978– 79), was loosely based on *The Guns of Navarone* storyline, *Gun on Ice Planet Zero* (Episodes 8 and 9, 1978).

Is it true that the JAPANESE EMPLACED BRITISH GUNS ON TARAWA that had been removed from Singapore?

Prior to the vicious November 1943 battle for Betio Island in Tarawa Atoll in the Gilbert Islands, the Japanese emplaced two pairs of 8in (20cm) guns on both ends of the island in concrete emplacements. After the costly battle it was discovered that these guns were British-made. The explanation for their origin was that they had been captured at Singapore in February 1942 and were subsequently dubbed the "Singapore guns," a story that still makes the rounds in Marine Corps lore.[151]

However, in reality, there were no 8in guns at Singapore.[152] These guns were part of an order of eight pieces Japan purchased from W. G. Armstrong-Whitworth and Vickers in 1905. These and earlier 8in guns had been purchased from Vickers and its Italian subsidiary and mounted on pre-World War I Japanese cruisers. With the cruisers sent to the breakers some of the guns were shipped to Pacific islands in 1943 to contribute to the Empire's outer defense belt.

Four other Vickers 8in guns of Italian origin were emplaced in Truk Atoll, a major Japanese Navy base in the Caroline Islands. Four British-made former shipboard 8in guns were moved to Wake Island after it was seized from the US. These too were attributed as being "Singapore guns." Additionally the Wake guns have been misreported as "5in" or "7in" and as having come from Hong Kong,[153] probably being confused with Singapore. Hong Kong had fallen in December 1941 and guns of these calibers were not positioned in either Singapore or Hong Kong. Similarly, two British Vickers 6in (15cm) guns were emplaced on Little Kiska Island adjacent to Kiska Island in the Aleutian Islands off Alaska and were discovered in August 1943 when the island was secured. They were dated 1897 and 1905 and they too were assumed to have been taken from Singapore. US

documents incorrectly report them as being “5in.” However, like their larger brothers, they had been purchased from Britain a generation before the war. Japan purchased large numbers of weapons from Britain into the 20th century and had a very close relationship with the Royal Navy. Many early Japanese warships had been built by the British.

Another myth related to the Singapore guns, which was partly true, was that the British colony fell to the Japanese because all the guns were emplaced to fire only out to sea. As such, they were unable to fire at land targets to prevent amphibious landings from the Malayan mainland. Many of the coast defense guns indeed could not fire inland or on the Straits of Johor separating the colony from the mainland. However, there were some that could and they did fire on Japanese troop landings. What reinforced the idea that they could not fire landward was that there were few high-explosive rounds available, some batteries had none. They were mainly supplied with armor-piercing rounds for anti-ship use. Thick-walled AP rounds with small explosive changes were marginally effective against ground troops. Additionally, it simply was not conceived that the Japanese could land on the east coast of Malaya from the South China Sea, attack through Commonwealth forces defending well to the north, and press south to attack Singapore in such a short time.

What is meant by, for example, a 5-inch 51-caliber gun?

The bore length of large-caliber guns is measured by “caliber,” which is different from the usual caliber measurement referring to the diameter of the bore, be it in millimeters, inches, or hundredths of an inch. In US service the bore length caliber is calculated by dividing the gun’s bore diameter in inches by the length of its rifled bore (exclusive of the chamber) in inches. For example, a navy 5in (127mm) gun with a 225in (21ft) bore (5/225) is 51-caliber. A 16in (406mm) gun with an 800in long bore is a 16in 50-caliber. Note that there is no decimal point in front of the caliber in this system, although it is sometimes encountered but this is an error. These may be shown as 5”/51 or 5/51. This system is commonly used by the US Navy for guns of 3in and larger bore. While the system may not be used in the designation of most artillery pieces, it is found in technical descriptions. The German Navy used a similar metric system until 1918, but the German

Army retained the system until the end of World War II for weapons above 30mm. This metric system was used by most European countries, although some countries included the chamber or used the overall length of the gun including the breech block. An example of this system is that a German 3.7cm antitank gun with a 166.5cm long bore is a 3.7cm L/45, the "45" being in centimeters (L = *Lange*; long).

Is artillery used to INTENTIONALLY TRIGGER AVALANCHES?

Yes it is. The US Forest Service began avalanche forecasting and control in 1939 when it issued the first ski area permits in Utah. The Snow Ranger Program soon followed. After World War II a Snow Ranger, Monty Atwater, who had served with the 10th Mountain Division, began using explosive charges to intentionally cause avalanches. The concept is for avalanches to be triggered before skiers enter an area and to prevent a massive snow buildup resulting in longer flowing and more destructive avalanches. It also prevents large avalanches from developing that can endanger inhabited areas and block highways and railroads. In Italy the Snow Ranger had seen army artillery trigger avalanches giving him the idea. In World War I some 60,000 Italian and Austrian troops fighting in the Alps were lost to avalanches, both naturally occurring and intentionally triggered by artillery. In one 24-hour period in 1916, 10,000 troops were lost by both sides in the Tyrol.

The Snow Rangers experienced great difficulty and danger hand-emplacing the charges. In an effort to find a better means they approached the Utah Army National Guard in 1949. The Guardsmen loaned the Rangers a 75mm M1897A4 field gun. This was a modernized version of the World War I "French 75," which had been adopted by the US in 1917 and upgraded for highspeed towing in 1934. This particular gun was maintained by the Guard unit as a salute gun. The gun was left in position in the Alta Ski Area with the agreement that only Guardsmen would fire it. Their armory was 25 miles away in Salt Lake City though and weather and immediate urgency sometimes prevented them making it up into the mountains to operate the gun when needed. When necessary, the Snow Rangers would fire it without authorization. This was stopped when the

supervisor found out, but a higher Forest Service official, with more common sense, soon authorized it after the Rangers were fully trained by the Guardsmen.

Efforts were made to obtain recoilless rifles (RRs), but it would not be until the 1960 Squaw Valley, California Winter Olympics that four 75mm M20 and two 105mm M27 surplus RRs were acquired. The RRs and ammunition were supplied by the army at below acquisition costs as it was less expensive to sell them than maintain them in storage. They were mounted on jeeps, pickups, flatbed trucks, or stationary platforms. In the late 1970s a pickup-mounted RR was misaimed and the round crested a ridge destroying a house under construction. Fortunately there were no injuries, but the Forest Service went to only static platform positions after that. The army or local National Guard trained the operators under the US Military Artillery for Avalanche Control Program. The Avalanche Artillery Users of North America Committee (AAUNAC) was established in 1987 as a professional organization to set standards, share information, and serve as a single point of contact with the army. Besides, the National Forest Service, highway or transportation departments of Alaska, California, Colorado, Nevada, Oregon, Utah, Washington, and Wyoming were using RRs for avalanche control. Canada too is involved in the program. Needless to say, the Department of Homeland Security keeps close tabs on the guns and ammunition used for avalanche control.

In the early 1990s surplus 75mm and 105mm RR ammunition had been expended; production had ceased after the Korean War. The 106mm M40A2 RR, already replaced by wire-guided antitank missiles, was available with ample ammunition stocks. In 1995 there was a fatal accident when a 106mm round exploded in the bore killing one man. The use of the rifles continued, but the operators were required to be behind cover and remotely fired the rifles. Two more 106mm RRs exploded without injury just two weeks apart in 2002 as a result of faulty ammunition. Some use was made of 105mm M101A1 and M102 howitzers from the late 1990s. There are even a few examples of 105mm M68 gun-armed M60A3 tanks being used. The use of the 106mm was suspended in 2003 and they were replaced by the 105mm M119A1 howitzer. Some states apparently still use 106mm RRs though. While a heavier and less mobile piece, the M119A1 howitzer offered much longer range and the ammunition was still in production. In 2004 some of these howitzers were recalled by the army to

cannibalize for parts needed to support operations in Iraq and Afghanistan. Some were replaced by the earlier M119. The army was planning to phase out the M119A1 for a lightweight 155mm, but it is now considering retaining it and producing new howitzers or adopting a replacement, so 105mm ammunition production will continue for some time. Eventually a replacement will be required though. This still might use the longtime standard 105mm ammunition.

While the Artillery for Avalanche Control Program is fairly expensive, it is worth it owing to the income brought in by skiers and snowmobilers, the lives saved, and the prevention of property damage and cleanup. Alternatives have been studied such as a pressurized gas gun projecting explosive charges, but they are exceedingly expensive to develop, comparatively short-ranged, and inaccurate because of their lower velocity easily affected by winds. Some of these, like the Avalancher, are in limited use. It is dangerous for the Rangers to hand-emplace explosive charges as they have to actually ski or snowmobile onto the potential avalanche zone. Helicopters have been used to drop explosive charges, but they are expensive to operate and cannot fly in poor and dangerous weather conditions plus the inherent dangers of igniting and dropping by hand high-explosive charges from within helicopters. Both techniques are used though according to circumstances. Recoilless rifles and artillery are also used in Canada and Europe for avalanche control. The USSR used 85mm KS-12 (M1939) antiaircraft guns for example.

The CHICKEN GUN

The “chicken cannon” or “rooster booster” is just one of those things that sounds like an urban legend from the outset, but if you think about it it makes perfectly good sense. Bird strikes have always been a serious hazard to aircraft. The approach of birds is often unseen until it is too late for the pilot to take evasive maneuvers and the birds themselves have no frame of reference nor the sense to comprehend what’s happening. Most birds are encountered at low altitudes, especially when landing and taking off. Even at these lower speeds bird strikes can be quite hazardous. At higher altitudes birds are less common, but they can be encountered. A Canadian goose weighs 6.6–19.8lb (3–9kg). The danger of bird strikes became even more

hazardous with the jet age with aircraft traveling at extremely high speeds and air-sucking jet intakes. The US Air Force alone records up to 3,000 bird strikes a year costing many millions of dollars in damages and even the loss of life.

A means was necessary to test the resistance of cockpit windshields, especially since new plastics were being used, impeller blades in jet engines, and other aircraft components. The simplest way to do this was to launch a dead bird at the proper relative speed at the statically mounted aircraft component.

This appears to first have been undertaken by De Havilland Aircraft in Hatfield, United Kingdom in the mid-1950s. In 1961 an improved design was in use by the Royal Aeronautical Establishment at Farnborough. It was soon being used in the US by the Federal Aviation Administration (FAA) and the Air Force known as the "Range S3 gun." It is today in use at several Air Force test establishments and aircraft construction plants. Chicken cannons have also been used to test the resistance of high-speed "bullet train" windshields and a similar gun was used to test hardened foam blocks and other objects striking the Space Shuttle.

The indoor mounted gun is relatively simple in design. It is a large bore 60ft barrel and is fired by compressed air. Some have shorter barrels. A dead, whole 4lb chicken, after defrosting, is placed in a cardboard ice cream carton, sans lid, loaded, and fired at the static aircraft component, such as a cockpit canopy. The carton encased bird is blasted down the 7in (178mm) barrel at up to 1,200ft/sec. Birds are fired into F-16 fighter canopies at 400mph. Inside the muzzle is a rim which halts the carton and the bird continues the short range to the target being filmed by super high-speed cameras. The target and film are examined for the results and reinforcement, redesign, and different materials are considered if the component did not resist the strike.

As can be expected, urban myths have resulted from the chicken gun. One is that the US National Aeronautic and Space Administration (NASA) cautioned the British when testing the bullet train to first thaw out the chickens. NASA does not operate chicken guns itself and the British have long experience with the system. There are several versions of this myth and different government agencies are attributed. One story has a cat sneaking into the cannon for a chicken feast when it was fired. Another is that the FAA gave in to protests by bird lovers (no live birds have ever been

used) and as a result now uses cats from animal shelters that are scheduled for euthanasia. This is not true, dead chickens are still used. It is also said that old battleship gun barrels are used. The chicken cannon only uses a smaller caliber steel tube, not an actual gun barrel. The Canadian television series, *Royal Canadian Air Farce* (1993–97) ran several outlandish skits based on the chicken gun, one being when the engineers, knowing frozen chickens could not be used, attempted to thaw one in a microwave resulting in a detonation in the break room. Another skit saw foreign engineers using badly translated instructions resulting in the firing of a cow rather than a chicken. At least the cow had been thawed.

The world's "most powerful" MOTOR SCOOTER

From 1956 to the mid-1970s the French airborne troops employed 800 modified Italian Vespa 150 motor scooters mounting a US 75mm M20 recoilless rifle (*canon sans recul*), nicknamed the "*Bazooka Vespa*." The big rifle's breech was fitted over the rear fender, the barrel ran under the driver's seat and handlebars, and protruded beyond the front wheel. The mounted driver/gunner straddled the rifle. Three rounds of ammunition were strapped on each side over the rear wheel. It was accompanied by a second Vespa with the loader, the M1917A1 tripod, and 10 more rounds of ammunition. The two Vespas, two paratroopers, 16 rounds of ammunition, and the 75mm RR with mount were dropped by five parachutes. The militarized Vespas were referred to as the TAP (*Troupes Aeról Porteés* – aerial troop carrier) Mod 56 and Mod 59. These unusual little vehicles actually saw action during the 1956 Suez Canal intervention and in Algeria into 1962.

Many websites claim or assume the rifle could be fired on the move or was fired from a static position while still on the scooter. The idea of firing while moving is utter nonsense. Even the slightest movement of the barrel much less bouncing on a road or across rough ground with even a movement of a fraction of an inch would cause the target to be missed at even a couple of hundred meters. There was no traversing or elevating mechanism to allow minor corrections when static. If it was simply aimed by "aiming" the scooter there is still no means of fine deflection adjustment or elevation correction; nor is there a sight. The sight mounting bracket is

just forward of the chamber and inaccessibly under the driver's seat as is the trigger. It would be virtually impossible to track a moving target with such a mounting. These "theories" of its use were predicated by the assumption that it was meant as an antitank weapon system. The 75mm RR could penetrate only 4in (100mm) of armor and was a very poor tank-killer.

In reality, the *Bazooka Vespa* was intended to provide an air-droppable, mobile direct-fire support weapon using HE, HEAT, and WP rounds. To fire the rifle it was first dismounted and fitted to its tripod in the normal manner. No doubt between the weight of the rifle (115lb), ammunition (120lb), and rider (almost 200lb with gear and weapon), it was a top-heavy, difficult to handle little vehicle with its horsepower maxed out by the weight. It used an 11-horsepower air-cooled 250cc two-stroke gas/oil mix engine. If there was ever a vehicle that needed bumper stickers saying, "If you can read this you're too close," this is it.

Again, so there's no misunderstanding, the RR was not ever fired while mounted on the scooter, but had to be set up for ground firing on its tripod.

When was the FIRST EXPLOSIVE BOOBY TRAP employed?

The first recorded, albeit limited, use of explosive booby traps in the Western World, or elsewhere as is so far known, was during the 1835–42 Second Seminole War. In 1836 an explosive booby trap was left by troops abandoning Ft Alabama in west-central Florida. It was activated by Seminoles entering the fort on their heels and the fort was destroyed. Details are not available. This *may* have been simply a musket activated by a tripwire to ignite black powder charge(s), either instantly or using a delayed powder train. However, the Chinese used complex interlinked, self-igniting mines activated when disturbed by invading Mongols in 1277. Again, details are not available.

Some use was made of explosive booby traps in the American Civil War. Referred to as "land torpedoes," "sub-terra torpedoes," or "sensitive shells," these were 24- and 32lb cannon and 8- and 10in mortar shells sometimes buried as landmines with a percussion-capped detonator nipple exposed. Landmines are after all a form of booby trap. They were first used by the Confederates in 1862 at Yorktown. There were also instances when desirable objects, such as a jackknife, were attached by a pull-cord to a

buried shell fitted with a friction igniter as used to ignite cannons. The use of these "infernal contrivances" and the "devilish ingenuity" regarding the morality and legality of their use was bitterly argued by both sides. Booby traps saw some use in World War I, much wider use in World War II, and gradually increasing use in insurgencies from post-World War II to the present where it has become a principal offensive weapon in the form of remotely-detonated improvised explosive devices (IED).

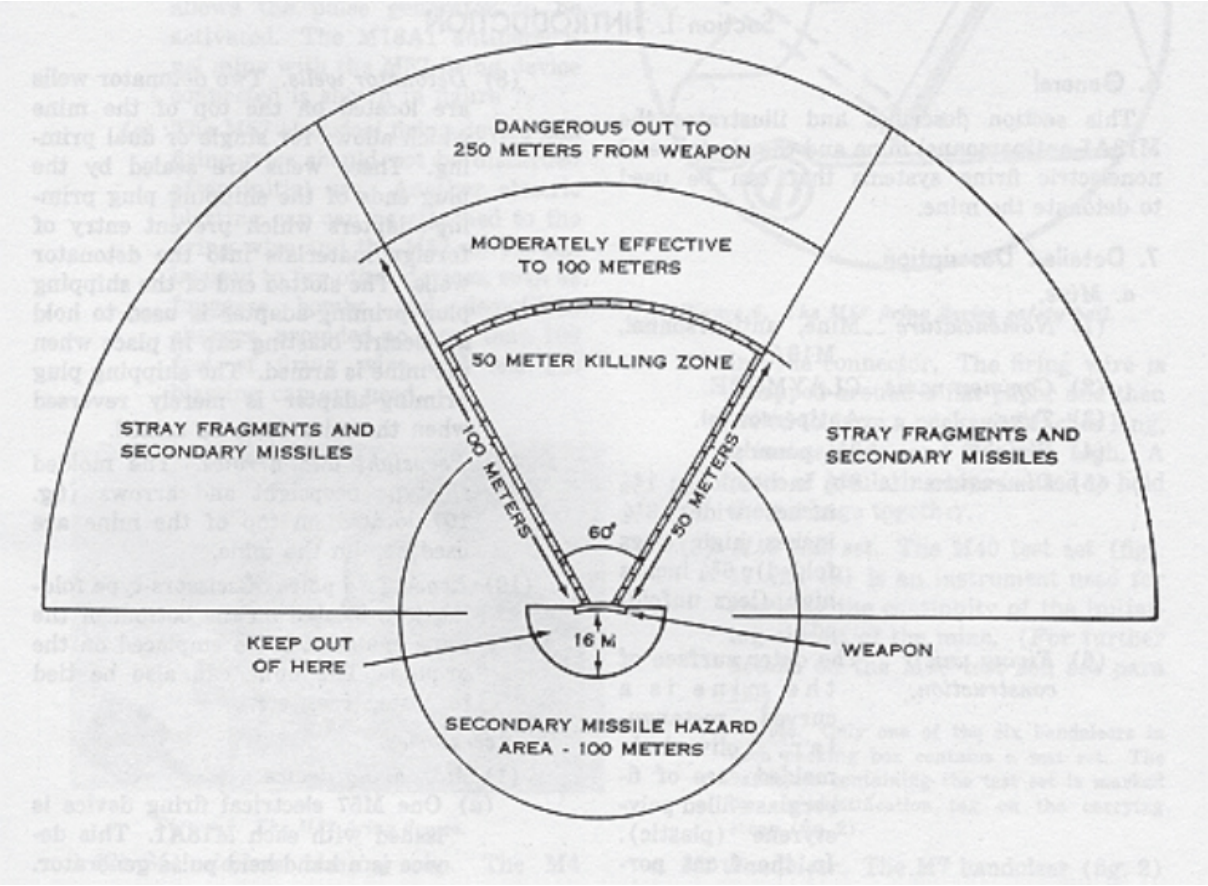
Where did the idea for the CLAYMORE MINE come from?

Germany developed a small tripwire-activated, cone-shaped, directional, antipersonnel fragmentation mine late in World War II, reportedly intended for emplacement on concentration camp fences. It did not see use during the war, but East Germany developed it further as the tripwire-activated SM-70 (*Splittermine 1970* – fragmentation mine) and emplaced it on Intra-German Border barrier fences, but not on the Berlin Wall, in 1970. They were finally removed in 1984 after extensive international protest.

France produced two large directional antipersonnel mines in 1947/48, a rectangular 10kg (22lb) and a circular 20kg (44lb) called a "flat antipersonnel 10/20-kilogram charge." They are believed to have seen some use in Vietnam in the early 1950s and influenced the design of similar Soviet MON-series of smaller directional mines, which were later used by the North Vietnamese. During the Korean War the Canadians fielded a horizontal-firing antipersonnel mine called the Phoenix.

The Communist Chinese human wave attacks experienced by UN forces in Korea led to the M18 Claymore mine developed by Norman A. MacLeod of the Explosive Research Corporation. Tested as the T48, it was standardized in 1958 and small numbers were used in Vietnam from 1961. A much improved model, the T48A1, was developed by Guy C. Throner of Aerojet and adopted as the M18A1 in 1960. It was widely used during the Vietnam War from 1964 with 60,000 eventually being produced per month. The Claymore's name is derived from the Scottish double-edged broadsword, a named picked by Norman MacLeod. Both weapons are capable of cutting a wide swath through the enemy. "Claymore" is the Anglicized version of the ancient Scottish term for "great sword," *claidheamh mor.*

Since the question is invariably asked, an M18A1 Claymore has 704 7/32in (5.6mm) diameter steel ball bearings embedded in an epoxy matrix backed by 1½lb of C4 plastic explosive, all contained in a fiberglass casing. The M18 used ¼in (6.5mm) steel cubes. It could be command-detonated by an electrical firing system or rigged for triggering by various booby trap firing devices ("mouse-trapping"). A large number of countries have directly copied or produced mines similar to the Claymore and include the FRONT TOWARD ENEMY and BACK warnings.



Does a 1,000lb AERIAL BOMB really weigh 1,000lb?

The short answer is no. The standard US Mk 80-series "dumb bombs" in current use actually weigh slightly more or less than the designated weight when fitted with standard conical fins. The weight designation is simply rounded off. They are heavier than the actual rated weight though when fitted with retarding fins and heavier still when PAVEWAY laser guidance

kits are installed making them “smart bombs.” The explosive filler only comprises about 45 percent of the bomb’s total weight. The same applies to foreign bombs; the designated weights are rounded off, higher or lower.

Bomb	Actual weight	Explosive filler
250lb Mk 81	260lb	96lb
500lb Mk 82	531lb	192lb
1,000lb Mk 83	985lb	445lb
2,000lb Mk 84	1,970lb	945lb

NOTE: 500lb = 227kg.

The term “blockbuster bomb” is often assumed to mean that a single bomb would destroy an entire city block. The term is of British origin and refers to its ability to destroy an apartment building, not a whole city block. A “block of flats” is the British description for an apartment building. The nickname is also attributed to such a bomb’s ability to destroy a reinforced concrete blockhouse (a massive bunker). The British did develop true blockbusters though, 4,000lb (1,800kg) high-capacity bombs known as “Cookies,” and even larger (see below). The largest German bomb was the 1,400kg (3,200lb) nicknamed the “Fritz” by British bomb disposal technicians. “Blockbuster” does not refer to a specific weight of bomb although some say it is a 500lb or larger bomb. The Germans, with a propensity of making bigger weapons, did not make any really large bombs. This was owing to a lack of heavy bombers capable of carrying them.

What were the largest NON-NUCLEAR BOMBS?

From late 1968 in Vietnam the US employed the 10,000lb (4,530kg) M121 and, from 1970, the 15,000lb (6,800kg) BLU-82 bombs. These were dropped from Army Sikorsky CH-54A Tarhe (“Flying Crane”) helicopters and Air Force Lockheed C-130B Hercules transports (COMMANDO

VAULT Program) to blast helicopter landing zones in dense jungles. Both were dropped by parachute making them not very accurate as they were greatly affected by wind speed and direction, which changed at different altitudes. Detonating 3ft above ground they produced no significant craters, but disintegrated trees in about a 130–165ft (rougly 40–50m) diameter area, sheared off trees for at least another 330ft (about 100m), blew away underbrush, and even killed the worms in the ground. It was also known as the "daisy cutter." "Daisy cutter" originally referred to small fragmentation bombs dropped in World War II as their fragmentation cut down low vegetation. The BLU-82 was called such because it blasted down trees in the same manner, but it is not really a proper nickname. BLU-82s were also dropped in 1990–91 during the Gulf War and later in Afghanistan from MC-130E special operations transports. Neither of these bombs were fuel-air munitions (FAM) as is sometimes reported by the lay-media.

These huge bombs were preceded by even larger bombs in World War II. The British developed the 12,000lb (5,440kg) high-capacity bomb designed to generate a tremendous blast effect. The 12,000lb medium-capacity bomb, the Tallboy, had sacrificed some blast effect by using a thicker casing to allow it to penetrate heavily reinforced concrete structures. This was followed by the mammoth 22,000lb (9,980kg) medium-capacity Grand Slam.[154] It was also called the "earthquake bomb." These two massive bombs could only be carried by British Avro Lancaster B.I Special bombers and were designed to attack German submarine pens (*U-Bootbunkerwerft*), which are so massively constructed that no effort has been made to demolish some of them to this day. "Earthquake bombs" were also used to sink the German battleship *Tirpitz* (sister ship of the *Bismarck*) in a Norwegian fjord. One such bomb blew a 200ft (60m) hole in her port side causing extensive fires, blew off "C" turret, and capsized the ship killing 1,000 of its 1,700-man crew. When used to attack two massive railway viaducts in Italy the near misses collapsed the structures. The Grand Slam penetrated 130ft (40m) into the ground before detonating to blow upward and crumble and buckle the comparatively thinner floors of reinforced concrete structures, hence the "earthquake bomb" nickname. The British dropped over 700 Tallboys and 41 Grand Slams during World War II.

The last Grand Slam to be detonated occurred in 1958 in Britain. The Lincolnshire County Council was widening the road passing the entrance to RAF Scampton, home to 617 Squadron ("Dam Busters"). At the RAF

station's entrance sat a 13ft 6in (4.11m) tall 22,000lb Grand Slam bomb casing, or so it was thought. In order to widen the road the bomb and the nearby memorialized Lancaster bomber had to be relocated a short distance. A massive truck crane was brought in to move the bomb. Attempting to lift the bomb, the 8-ton capacity crane could not budge it. Assuming it must be filled with concrete they removed an access plate to discover it was still filled with 9,135lb (4,144kg) of Torpex D1 explosive. A larger crane was acquired and the live bomb carefully loaded on a heavy-capacity trailer and taken under police escort to the Proof and Experimental Establishment, Shoeburyness on the coast. When detonated the concussion was felt up to 10 miles away. It is estimated that if the display bomb had detonated above ground with the equivalent of 6.5 tons of TNT, much of RAF Scampton and the northern portion of the City of Lincoln would have been destroyed.

The US produced copies of the Grand Slam to be carried by modified Boeing B-29A Superfortress medium bombers.[155] It was designated as "bomb, general purpose, 22,000-pound, M110" (T14). The US also adopted the 12,000lb Tallboy as the M123 (T10/T39). In the early 1950s the US developed a vastly larger bomb, the 44,000lb (19,960kg) T12 Cloudmaker to provide a highly destructive non-nuclear option. Carried by the Convair B-36J Peacemaker bomber, it was never employed operationally. In the winter of 1950/51 B-29s dropped 12,000lb ASM-A-1 (aka VB-13 [vertical bomb] or XM674) Tarzon (said to mean "Tall Boy Range and Azimuth Only," but this is not confirmed) radio-guided bombs on major bridges in North Korea and reputably on Kanggye in the country's north in an effort to kill key enemy leaders. These were a much modified version of the M123 Tallboy and the guidance system proved none too accurate (only one direct hit was scored) and there were safe-arming difficulties resulting in its use being suspended. There was also a 10,000lb M121 (T59) general-purpose bomb informally called the "Grand Slam" and "Earthquake" bomb.

The Massive Ordnance Air Blast (MOAB – pronounced "mo-ab") bomb, colloquially known as the "Mother Of All Bombs," was developed in 2003 as the 21,000lb (9,525kg) GBU-43/B to be dropped by Lockheed MC-130H Combat Talon II special operations transports capable of low-altitude infiltration into enemy airspace. Filled with 18,700lb (84,080kg) of explosives, it was designed to airburst generating a massive shock wave. The MOAB was claimed to be capable of destroying nine city blocks, more like a "neighborhood-buster." While available, it was not used during the

2003 invasion of Iraq and the Air Force's overstated "Shock and Awe" Campaign.

The newest "Big BLU" (pronounced "Big Blue") is the yet unused 30,000lb (13,600kg) GBU-57A/B precision-guided Massive Ordnance Penetrator (MOP), aka "Direct Hard Target Strike Weapon" – unconfirmed, containing 6,000lb (2,700kg) of explosives. Two can be dropped from a modified Boeing B-2A Spirit stealth bomber or Boeing B-52H Stratofortress bomber. Its designation was unannounced until recently. Although it was called the "Big BLU," being a precision-guided bomb it was actually designated GBU-.[156] Its development has been stepped up in event of possible use in Iraq or North Korea, especially since the cancellation of the Robust Nuclear Earth Penetrator, based on the lightweight M61 nuclear bomb adapted as a deep underground bunker-buster.

In September 2007 Russia announced the detonation of the "Father Of All Bombs" (FOAB) or the Aviation Thermobaric Bomb of Increased Power (ATBIP), claiming it to be four times more powerful than the American MOAB ("Mother Of All Bombs"). The Russians claim their bomb contains 7.8 tons of a more powerful unrevealed explosive than that found in the 8-ton MOAB. The MOAB detonates with the equivalent of 11 tons of TNT and the Russian with 44 tons for a 300m (990ft) blast radius – these are Russian announced figures. The parachute-delivered bomb was claimed to be dropped from a Tulpolev Tu-160 BLACKJACK bomber. Many analysts believe it was actually dropped from a large cargo aircraft's tailgate. The Russian-released video showed a Tu-160 and the bomb descending by parachute, but not the bomb actually being dropped by the bomber nor were they ever shown in the same frame. The lay-media has referred to it as a "vacuum bomb"; it is a thermobaric munition on which Russia/Soviet Union has undertaken considerable developmental work. This has been assessed as another Russian "quantity over quality" goal as there is little need for such a massive unguided weapon lacking a deep-penetration capability unless there is an extremely high-value and large surface target and no concerns over collateral damage.

The last of the largest US nuclear bombs was the 10,000lb B53 fielded in 1962. Many of the 9-megaton weapons, designed to attack targets deep underground, were dismantled in the 1980s, but the last example was dismantled on October 25, 2011. They had been retired in 1993 and were

600 times more powerful than the Hiroshima Little Boy bomb. The largest remaining US nuclear bomb is the 1.2-million-megaton B83.

What was the SMALLEST BOMB?

There have been numerous types of small bomblets – submunitions or cluster bombs – delivered from larger bomb-like dispersing containers. These bomblets could be antipersonnel, anti-vehicle, anti-materiel, incendiary, chemical, or other types. The smallest bomb, however, would be the LAZY DOG bomb, although some would argue that it is not really a bomb as it contains no explosive charge. Nonetheless it was a free-falling, bomb-shaped, casualty-producing aerial weapon dropped by aircraft – sounds like a bomb to me.

LAZY DOG was its Korean War and Vietnam War era developmental codename. A similar test project had been undertaken during World War II, but was not used operationally. Such bomblets had been used by France and other countries, including the US, in World War I – *fléchettes d'avion.* These were dart-like flechettes typically 3/8in (10mm) in diameter and 3.94in (100mm) long. For two-thirds of their length longitudinal machine cuts formed four fins.

The LAZY DOG concept saw tiny bomb-shaped ballistic projectiles dropped in large numbers as area antipersonnel and anti-materiel weapons. The tiny bomblets have also been called "Red Dot bombs" or "Yellow Dog bombs" (possibly "Dot" was meant to be "Dog"), but it is not known if these were official designations, probably not. They relied on terminal velocity and their ballistic shape for their destructive force traveling at speeds in excess of 500mph (800km/h). They could be used against troops, soft-skin vehicles, parked aircraft, unprotected equipment, tents, and bulk supplies. Radar, communications, and missile sites were especially vulnerable. The bomblets could penetrate through trees, brush, sheet metal, lumber, and light building roofs and walls. A bomblet penetrated 12in (300mm) of packed sand while a .45 ACP bullet penetrates only 6in (150mm). Several bomblet shapes were tested. The typical LAZY DOG weighed 207 grains (0.7oz or 19g) and was ½in (13mm) in diameter and 1.77in (45mm) long including the fin assembly. The solid steel body was forged or machine-lathed while the four-blade fin assembly was stamped

and brazed to the body. Up to 17,500 bomblets could be packed in paper packages contained in the Mk 44 cluster bomb adapter (also used for other more conventional bomblets). This looked similar to a blunt-nosed general-purpose bomb. Depending on how the LAZY DOGS were packed it could weigh from 560 to 625lb (254–284kg); 69.9in (1,775mm) long and 14.18in (360mm) in diameter. Dropped from any altitude, a timer activated the bomb adapter breaking it open at a low altitude and scattering the bomblets over a wide area. Regardless of how they were oriented, upon opening the bomblets immediately oriented themselves point down. Approximately eight bomblets struck in every square yard (approximately a square meter). The result against personnel was grisly and steel helmets offered no protection. They could also be hand-dropped from buckets or the split-open paper containers tossed from the tailgate door of cargo aircraft or helicopters flying at low altitude, but their accuracy with this delivery means left much to be desired.

Much was made of their indiscriminate lethal effects and they were withdrawn from use during the Vietnam War. LAZY DOGS were no more inhumane or indiscriminate than a 500lb high-explosive bomb or a Douglas AC-47 Spooky (aka “Puff the Magic Dragon”) gunship mounting three 7.62mm GAU-2/A Miniguns firing a total of 12,000 rounds per minute into a football field-size area.

As a footnote, during World War II the British were developing an even smaller “bomb.” Details are vague, but they conducted research on the possibility of using small needle-like darts released from dispensers in a “cloud” of descending darts. These were hollow steel needles fitted with a paper stabilizing tail and containing an unspecified toxin backed by an “inertia pellet.” When the dart struck a person the inertia pellet was propelled forward forcing the toxin into the victim. Singer Sewing Machine Company was approached in regards to producing the needles. The project was cancelled for a variety of reasons, one probably being the prohibition of using “poison bullets.” Others were their practicality and limited effectiveness.

What is FOUGASSE?

The exact origin of the word “fougasse,” or “fougas” as it is sometimes called in an Americanized form, is unknown, but it may have been derived from the French word *foudroyer* (to strike with lightning). *Fougasse* is also a form of French bread, but this has nothing to do with the weapon, unless maybe the bread is burnt. Flame fougasse weapons, although usually identified with Vietnam, were first widely used by US forces during the Korean War.

The fougasse as a non-flame antipersonnel weapon dates back to the 16th century, however. A hole was dug angled toward the enemy; a bagged black powder charge was placed in the bottom, a board was set on top of this – a “kicker plate” – and the hole back-filled with small rocks. When the enemy infantry or cavalry attacked, a time fuse was lit to blast the rocks into their momentarily startled faces. This was done as early as 1565 by the Knights Hospitaller against the Ottoman Turks during the Great Siege of Malta. The “stone mortar” pits, cut into the island’s bedrock, were quite large and some remain today. The fougasse was frequently used through the history of warfare including by the Russians during the 1853–56 Crimean War for the defense of Sevastopol. The term was later accepted to mean command-detonated mines. The earliest known use of flame fougasse weapons by the US was during the Korean War in 1951.

In Vietnam a major US television network reporter once enthusiastically claimed he had “proof” that the US was using “chemical warfare agents” in the form of “fou gas.” We need not dwell on this other than it might have been called “fool’s gas” along the line of “fool’s gold.” By the way, the employment of fougasse weapons is completely legal within the Hague Convention and is not classified as a chemical warfare agent, its just gasoline. It was also incorrectly called “foo-gas” and “phougas.” The latter possibly derived from “phosphorus.” White phosphorus hand grenades have been used to ignite flame fougasse weapons, but phosphorus is not a component of the fuel.

Fougasse weapons are command-detonated and the weapon’s position and kill zone are under surveillance. They consist of a fuel-filled metal container fitted with a detonating charge to blow the fuel out and another incendiary-type charge to ignite the fuel. While impressive when detonated, there are limitations that must be understood in order to provide for the effective employment of fougasse weapons. When detonated the resulting fireball, though projected toward the enemy, ascends very rapidly and

disperses because of its intense heat. The detonating charge will blow the burning fuel only so far before the fireball is dissipated or rises and it quickly burns itself out. The fireball, while it will certainly burn and scorch the target, is of extremely short duration. Adding a thickener to the fuel will greatly enhance its effectiveness as it will cause it not to rise or disperse quite so rapidly and the burning fuel will adhere to the target to burn longer and cause more damage. On level or near-level ground fougasse weapons are dugin and angled to 25–45 degrees from horizontal. On a hillside they are dug-in horizontally. Fougasse weapons are most effective when several are fired in volley to cover an avenue of approach. The containers must be able to be completely sealed to prevent leaking and evaporation of the fuel. Something the manuals fail to include is that thickened fuel usually breaks down in about three weeks, especially in hot weather, and has to be replaced. Fougasse weapons and flame mines should be inspected every two weeks for fuel evaporation, breakdown, leaks, and integrity of the firing and ignition systems to include circuit testing the electrical firing systems. The Army's FM 20-33, *Combat Flame Operations*, June 1967 provides instructions on the fabrication of flame weapons. However, there are several dangerous practices described in their fabrication. Only a highly qualified individual should review and examine these procedures before attempting to fabricate the weapons according to the manual's sometimes flawed directions.

Is it true that the concept of the RADIO-CONTROLLED TORPEDO was conceived by a MOTION PICTURE STAR?

True, Hedy Lamarr (1913–2000) to be exact. The Austrian-born actress was dubbed one of the most beautiful women in the world in the 1930s and 1940s. Under the name Hedwig Eva Maria Kiesler, her birth name, she and German-born naturalized composer-pianist George Antheil (1900–59) designed and patented a radio-controlled torpedo filing it in the US Patent Office in August 1942. The torpedo was to be guided by a radio system that constantly changed its frequency to prevent it from being jammed. It used a piano roll to change between 88 frequencies. The system was never built, but the concept of the frequency-hopping radio was later used in modern radios such as the SINGARS (Single-Channel Ground-Air Radio System)

currently used by the US armed forces. It is not known why a Hollywood sex goddess had an interest in torpedoes, but from 1933–37 she had been married to Friedrich Mandl, the Austrian chairman of the German ammunition firm, *Hirtenberger Patronen-Fabrik.* However, it was an abusive relationship and it is doubtful she was influenced by him in the ordnance field.

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[129] Pyrotechnic blasting caps, or detonators, were developed in America in 1864 by Alfred Nobel. Electric detonators date back to 1750 being developed by Benjamin Franklin (1706–90), although they did not see wide usage until after 1875 when effective electric-generating blasting machines (aka detonating machines or "hell boxes") were developed.

[130] Since 1956 the NATO phonetic alphabet words have been WHISKEY and PAPA, but the "Willie Peter" phrase has remained in use; "Whiskey Papa" just does not have the same ring to it.

[131] Smoke screening compounds are rated by their "top obscuring power" (TOP). TOP is a relative value that indicates the amount of obscurity (due to reflection and refraction of light rays) that 1lb of smoke-producing compound will develop under standard and controlled conditions against a 25-candlepower light source (average daylight).

[132] German paratroopers, the *Fallschirmtroopen*, were a component of the Luftwaffe (Air Force) and not the Heer (Army).

[133] MD1 was responsible for developing explosives and related devices for the Special Operations Executive (SOE) and the armed forces.

[134] *Schützen* literally means "shooter" and is the common German term for a rifleman.

[135] The SNLF is sometimes incorrectly referred to as "Imperial Marines." The Japanese never referred to them as such.

[136] In the Red Army the "army" was a corps equivalent command with two to five divisions rather than a command comprised of two or more corps as was Western practice.

[137] One might notice that the US "pineapple" fragmentation hand grenade is found designated both Mk II and Mk 2 in this work. That is because the Mk II and Mk IIA1 were redesignated the Mk 2 and Mk 2A1 on April 2, 1945 as were the Mk III (Mk 3)-series offensive "concussion" grenades.

[138] Not to be confused with the 40mm canister rounds loaded with 20 (M576E1) or 27 (M576E2) No. 4 (0.24in) lead buckshot pellets.

[139] In June 2011, the *Guinness Book of World Records* was revised and the butch T Trinidad scorpion pepper was declared the hottest measured at 1,463,000 Scoville units. There is also a nega viper pepper at 1,359,000 units.

[140] Hydrocyanic Acid (AC), a blood agent, is an aqueous (water soluable) solution of hydrogen cyanide (formula HCN); aka prussic acid. Artillery-delivered AC was first used by the French in 1916. It is dangerous to store and decomposing AC can cause projectiles to explode. AC smells like bitter almonds. Blood agents, also known as cyanogen agents, prevent the normal transfer of oxygen from the blood to body tissue. Victims experience nausea, vomiting, and increased respiration or slow gasping respiration prior to suffocation within 15 minutes.

[141] Lewisite (L), or chlorovinyldichlorarsine, is a dark oily liquid smelling like geraniums. Developed in the 1920s it is a non-persistent blister agent, toxic lung irritant, and systemic poison. It is fatal in high concentrations in 10 minutes, but in the open and in light concentrations it might take hours for symptoms to appear.

[142] "Flash" is said to mean "FLame Assault SHoulder weapon," but it is not known if this is official or an after the fact made-up acronym.

[143] TPA contained triethylaluminum (TEA), a substance which, when exposed to air at temperatures between 1,400–2,200°F (760–1,200°C), burns spontaneously which was achieved via the detonation of the bursting charge.

[144] The Little David is usually reported as being "36in," but officially it was designated the 914mm.

[145] Not to be confused with the 1988 Russian VAZ Oka subcompact car. The Oka is a river flowing through Moscow.

[146] Battleships were a type of the heaviest capital ships. None remain operational anywhere today, although some are moth-balled in reserve. Please do not be confused by the media's erroneous tendency to refer to any and all naval combatant ships as "battleships." The term they are looking for is "warships."

[147] An unfounded rumor claims that atomic cannons were deployed to Korea during the fighting. They were operational at the time, but none were sent. This rumor was spawned by the deployment of 240mm M1 howitzers in March 1953 and some say that President Eisenhower encouraged the rumor to rattle the Chinese during the ongoing truth talks. It is optimistically claimed though that the May 1953 live nuclear test shot had an impact on truth negotiations, which saw the signing of a ceasefire in July

[148] There were actually two 28cm K5 guns shelling the Allied beachhead at Anzio in 1943, the "*Robert*" and the "*Leopold*." The Germans built 25 of these guns, which they collectively called the "*Burno*," accompanied by 54 supporting railroad cars.

[149] This entry addresses mobile field artillery and not railroad or fixed coast defense guns. The coast artillery used 12in M1895-series, 14in M1907/M1909/M1910, and 16in Mk II Mod 1 guns among others through World War II. There were also the 12in M1890M1 and M1908 coast defense mortars. During World War I the Navy built some 14in Mk 4 railway guns for use in Europe, former battleship guns, and later employed them for coast defense in the US. The Army's 14in M1920 railroad guns were also used for coast defense. The 36in T21 "Little David" mortar was never standardized or employed operationally so is not included among the largest mobile field artillery.

[150] The "*Lange Max*" was actually the 38cm (15in) SK L/45 naval gun originally built for two Sachsen-class battleships (SK = *Schnelladekanone* – rapid-loading cannon). Neither of the ships was completed during World War I and the eight guns were fitted on both railroad and fixed mounts and used on the Western Front.

[151] The myth was explained in a 1993 Marine Corps publication, *Across the Reef: The Marine Assault on Tarawa.*

[152] The British coast defense guns at Singapore included 16x 6in, 6x 9.2in, and 5x 15in.

[153] The British coast defense guns at Hong Kong included 4x 4in, 17x 6in, and 8x 9.2in.

[154] "Medium-capacity" did not mean these massive bombs were considered "medium weight," but referred to the ratio of filler to the bombs' overall weight and had a comparative thick case to improve penetration. A "high-capacity" bomb had a thinner case and thus more filler providing more blast effect, but achieving less penetration.

[155] During World War II the B-29A was rated as a "very heavy bomber", but it was reclassified as a "medium bomber" in mid-1948 owing to the development of the B-36 Peacemaker very heavy bomber and the retirement of the B-17 and B-24 heavy bombers. The Boeing B-47 Stratojet replaced the B-29/B-50 as the new medium bomber while the Boeing B-52 Stratofortress became the heavy bomber replacing the B-36.

[156] The Aeronautical and Support Equipment Type Designation System (ASETDS) codes BLU and GBU are not abbreviations, but simply codes, even though in this rare instance GBU does actually serve as an abbreviation, "Guided Bomb Unit." BLU does not mean "Bomb, Live Unit" as is

sometimes claimed, which is only an attempt to explain the designation. BL = Bomb (non-nuclear), GB = Guided Bomb (not self-propelled), U = Unit.

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